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ENCYCLOPÆDIA BRITANNICA.

A.

A, THE first letter of the alphabet in every known language, the Ethiopic or Abyssinian alone excepted, in which it is the thirteenth. Of the sixteen elementary sounds of the human voice, that which is represented by this initial letter is the simplest, and requires the least exertion of the organs to produce it; for its enunciation is effected by merely opening the mouth, and breathing, so that the air propelled through the glottis may resound audibly in the cavity of the mouth and nostrils. Hence this sound is remarkable for its universality as well as simplicity. Many of the lower animals possess the capacity of uttering it, as every one must be sensible who has attended to their distinguishing cries, in all, or at least in many of which, it may be easily recognised. It is also the basis, so to speak, of vocality; for, on attentive examination, it will be found that the other vowels are little more than labial, lingual, dental, or palatal modifications of this primary, universal, and most elementary sound. It is not without reason therefore that the symbol of this sound is (with one solitary exception) placed at the commencement of every known alphabet. Cicero seems to have disliked the sound of this letter; for in his treatise *De Oratore*, c. xlix. he denominates it *insuavissima littera*, probably on account of the out-breathing or expiration necessary to produce the sound of it; but, upon the same principle, the other vowels ought also to have shared his displeasure, seeing that they are merely modifications of this primary *στοιχειον* or element.

In the English language, A is the mark or symbol of three different sounds, termed by grammarians the *broad*, the *open*, and the *slender*; epithets, the two former of which have an immediate reference to organic modification, as well as to the impulse or volume of voice; while the latter seems to apply to the degree of intonation alone. Of these varieties of sound, the first, which resembles that of the German A, occurs in such monosyllables as *hall, wall, pall, thrall*, where the *a* is pronounced in the same manner as *au* in *cause*; that is, broad and long. The Saxons, it is probable, expressed only this sound of the letter, which is still commonly retained in the north of England, and prevails universally throughout Scotland, the only parts of the island where the genius and idiom of the Saxon language have withstood modern innovations. The open sound of A, again, resembles that of the Italian in *adagio* and such like words, and is nearly the same with that of *a* in *father, rather*, &c. But the slender sound, which is peculiar to the English language alone, is identical with the sound of the French diphthong *ai* in such words as *mais, paix, gai*, and is exemplified in *hate, late, waste, paste, place, race*; as also in polysyllables, such as *toleration, justification*, with many others which it is unnecessary to specify. So much for the varieties of this initial sound in English words. A, however, is sometimes employed as an affix in burlesque poetry; in which case it has no other effect than to add a syllable to the line, without any alteration of the sense, just as the vowel or interjection O very often does in our old ballads, and in some modern imitations of them. It is also thought to be redundant and insignificative in such words as *arise, awake, aright, adoing, agoing*. But this seems a mistake; for the *a* here used as a prefix, is probably the French abbreviation of the Latin preposition *ad*; and hence it appears to have an intensive effect, adding to and strengthening the import of the word with which it is combined. In the line, "*Arise, awake*, or be for ever fall'n," it is evident that the words "arise, awake," convey a meaning stronger in degree than the simple words *rise, wake* would have done. The prepositionary effect in such words as *a-doing, a-going*, is indeed admitted by grammarians; but, if this be the case, where is the distinction between these instances and *a-rise, a-wake*, where the prefix is said to be redundant, except that, by usage, it has coalesced in some measure with the word to which it is prefixed? In such compounds as *a-foot, a-sleep, a-week, a-head, a-man*, as well as when used before local surnames, as *Cornelius a Lapide, Thomas a Kempis, Thomas a Becket*, nobody has ever doubted that the *a* is a preposition. When *a* is used as an article, it is merely an abbreviation of the old primary numeral *ane*, one, and consequently it has no plural signification. Thus *a* house, *a* field, *a* ship, mean *one* house, *one* field, *one* ship; but as it is not one of two, ten, or twenty houses, fields, or ships, but of *any* number, however great or small, hence it becomes in effect quite general and indefinite, or, in other words, the opposite of *the*, which defines and limits the attention to something spoken of, pointed out, or referred to.

Among the ancients, A was a numeral letter, and stood for 500, and when a dash was placed on the top, thus, Ā, for ten times that number, or 5000. In the Julian calendar it is the first of the seven Dominical Letters. Long before the establishment of Christianity, it had been in use among the Romans as one of the eight *Litteræ Nundinales;* and it was in imitation of this usage that the Dominical Letters were first introduced. Among logicians, the letter A is employed as a symbol or sign to denote an universal affirmative, in contradistinction to an universal negative proposition, in conformity with the following, which is the first verse of a well-known distich:

Asserit *a*, negat *e*, sed universaliter ambæ.

Thus, the first mode of the first figure, which is a syllogism consisting of three universal affirmative propositions, is said to be a syllogism in *Barbara*, a word in which the *alphas* alone are significant, the repetition of that letter thrice denoting so many of the propositions to be affirmative and universal, conformably to the technical classification—

Barbara, Celarent, Darii, Ferio, dato primæ.

In the public assemblies or *comitia* of the Romans the letter A was used in giving votes or suffrages. When a new law was proposed, each voter received a couple of wooden tallies or ballots, one of them marked with a capital A, signifying *Antiquo*, q. d. *antiquam volo;* and the other with U. R., the initials of *Uti Rogas*. Those who were against the proposed law, (or *rogatio*, as it was called) threw the former of these into the urn; meaning thereby *I antiquate it*, I prefer the ancient law, and desire no innovations; while such as were favourable to the bill, as we would call it, threw in the latter, signifying, *Be it as you desire*, or I vote for the measure you propose. A was also marked on tallies or tablets used in voting in criminal trials, and, standing for *Absolvo*, denoted acquittal; whence Cicero, in his speech for Milo, denominates it *littera salutaris*, or the letter of acquittal. We may add, in explanation, that, on criminal trials, three of these tallies or tablets were distributed to each of the *judices*, or persons constituting the assize, by whom the accused was to be tried; one of them marked with the letter A, *absolvo*, I acquit; another with the letter C, (*littera tristis*) *condemno*, I condemn; and a third with the letters N. L. *non liquet*, it is not clear. From the number of ballots cast into the urn, those marked with N. L. were deducted, and the *prætor* or *magistratus* pronounced sentence of acquittal or condemnation, according as the A's or the C's were the more numerous. In cases of equality the prisoner was absolved.

In ancient inscriptions, whether on marble, brass, or stone, A stands for *Augustus, Augustalis, ager, agit, aiunt, aliquando, antique, assolet, aut;* A A for *Augusti, Augustæ, Aulus Agerius, æs alienum, ante audita, apud agrum, aurum argentum;* A A A for *Augusti* when they are three in number, and *aurum, argentum, æs;* and sometimes its meaning can only be determined by the context of the inscription. Isidore adds, that when this letter occurs after the word *miles*, a soldier, it denotes him young (*miles adolescens*). On the reverse of ancient medals, it indicates the place where they were struck, as Argos or Athens; but on coins of a modern date, it is the mark of the city of Paris, probably taken anagramwise from the *last* letter of the word *Lutetia*.

A, as an abbreviation, is likewise of frequent occurrence in the works of modern authors; as A. D. for *anno Domini*, A. M. for *artium magister, anno mundi*, &c. The letter *a* with a line above it thus, *ā*, is used in medical prescriptions for *ana*, of each; and sometimes it is written thus, *ā ā;* for example, ℞ *mel. sacchar, et mann. ā vel āā* ℥j; that is, take honey, sugar, and manna, of each one ounce. Put to bills of exchange, A is, in England, an abbreviation of *accepted*, and in France of *accepté*. It is likewise usual with merchants to mark their sets of books with the letters A, B, C, &c. instead of the ordinary numerals, 1, 2, 3, &c. A A A is the chemical abbreviation for *amalgama* or *amalgamation*. (A.)

AA, a river of the province of Groningen, in the kingdom of the Netherlands, which runs into the Dollart. It is distinguished by the name of Westerwolder Aa.

Aa, a river in the province of Overyssel. in the Netherlands, that runs into the Zuyder Sea.

Aa, a river of the province of Antwerp, in the Netherlands, which discharges its water into the Neethe.

Aa, a river of France, rising in the Pas de Calais; becomes navigable for barges at St Omer; and, after a course of about forty miles, enters the sea at Gravelines. Two canals are supplied from this river, that of Colme and of Bourbough. Three small streams in Switzerland bear the same name, one in Saxony, and one in Courland.

Aa, a river in the Russian government of Courland, which rises in the eastern part of that province, and after receiving the waters of the Sussy, the Eckau, the Pluten, the Anz, and the Berse, enters the Dwina.

Aa, a river in the Russian province of Livonia, which runs from east to south-west into the bay of Riga.

AAHUS, a little town of Germany, in the circle of Westphalia and bishopric of Munster. It is the capital of Aahus, a small district; has a good castle; and lies north-east of Coesfeldt. Long. 7. 1. E. Lat. 52. 10. N.

AALBORG, one of the four sees (*stifts*) into which the Danish kingdom, properly so called, to distinguish it from the two provinces of Holstein Sleswick and Lauenburg, which are a part of Germany, is divided. The see of Aalborg is the northernmost part of the peninsula of Jutland, encompassed on the east, west, and north sides by the ocean, and on the south bounded by the provinces of Ribe, Aarhuus, and Wiborg. The extent is 2902 square miles, or 1,857,280 English acres. The surface is generally level, with on the northern part a succession of lakes, that nearly extend from one side of the province to the other. In the north-east and east part are some hills, the highest of which attain the height of 1200 feet. The agriculture is in a neglected state, and the manufactures are in a still lower condition. The chief branch of industry is the fishing, especially for herrings, which, when cured, are exported in large quantities. The see is divided into three amts or bailiwicks, comprehending 10 cities, 3 market towns, and 114 parishes. The inhabitants amount to about 135,000: in the year 1814 the births were 2756, and the deaths 1997. The whole of the population are of the Lutheran profession, and speak the Danish language; but among the superior classes the German is generally understood.

Aalborg, a city in Denmark, the capital of the see of the same name. It is situated on the Lymfiord, at the spot where the Oosteræ joins it; is tolerably fortified; contains a cathedral and several other public buildings, with 830 houses, and 6600 inhabitants. There are manufactories of sugar, soap, snuff, chocolate, and scythes, with several distilleries; but the woollen and hosiery trades which formerly existed are nearly extinct. The entrance to the harbour is such as to require vessels drawing more than 10 feet of water to lighten before they approach the city. The chief exports are herrings, corn, wool, hides, tar, tallow, and corn spirits. It is in Lat. 57. 2. 57. N., and Long. 9. 50. 36. E. The amt or bailiwick of Aalborg, which is the best part of the see, extends over 1088 square miles, of which three-fifths is ploughed land, and the rest either heaths or morasses, with some woods. It has 3 cities, 2 towns, 113 villages, and 65,000 inhabitants.

AALEN, a bailiwick in the circle of Jaxt, in the kingdom of Wirtemberg. Its extent is 108 square miles, or 69,120 acres. It is watered by the river Kocher, has some lofty mountains in the southern part, and is most abundantly wooded. It produces but little corn, and neither fruit nor wine, but pastures a competent number of cattle. There are some iron mines worked. Many articles of wood-ware are produced, and some wool and cotton are spun. It contains one city, one market town, and 190 smaller towns and villages, with 20,931 inhabitants.

Aalen, a city, the capital of the bailiwick of the same name. Its chief trade is in woollens and in breweries, and some cotton is spun. It contains 2719 inhabitants. It is in Lat. 48. 47. 20. N. Long. 10. 7. 27. E.

AALSMEER, a town in the arrondissement of Amsterdam, in the province of North Holland. It is near the lake of Haarlem; celebrated for its strawberries; contains 1811 inhabitants, employed in making cotton goods.

AALTEN, a town in the arrondissement of Zutphen, and province of Gelderland, in the Netherlands, containing 3524 inhabitants.

AAM, or Haam, a liquid measure in common use among the Dutch, containing 128 measures called *mingles*, each weighing nearly 36 ounces avoirdupois; whence the *Aam* contains 288 English, and 148⅔ pints Paris measure.

AAMADOT, a town of Norway, in the bailiwick of Hedemarken and see of Aggerhuus. It is situated on the river Glommen, has 2729 inhabitants, and some trade in making woollen and cotton caps.

AAR, the name of two rivers; one in Switzerland, the other in Westphalia, in Germany. It is also the name of a small island in the Baltic.

AARASSUS, in *Ancient Geography*, a town of Pisidia, in the Hither Asia, thought to be the Anassus of Ptolemy.

AARAU, or Arau, a circle in the canton of Aargau, in Switzerland, containing the city from which its name is derived, and 12 other places, with 2340 houses and 12,220 inhabitants.

Aarau, the chief city of the canton of the same name, on the banks of the river Aar, over which there is a covered bridge. It is well built, paved, and, at night, lighted. It has a handsome government house, a church, a hospital, 450 dwellings, and 3500 inhabitants, who are very industrious manufacturers. The chief pursuits are making silk ribbons, spinning and weaving cotton, some tanning and cutlery, bleaching, and casting cannon. It is in Lat. 47. 23. 31. N. Long. 8. 4. 32. E.

AARBURG, a city in Switzerland, in the circle of Zofingen, and canton of Aargau. It stands at the confluence of the rivers Aar and Bigger, has a strongly fortified castle, the only one in Switzerland, which is the depot for military stores. The city contains 154 houses, and 1100 inhabitants, who make cotton goods and hosiery.

AARDENBURG, a town in the arrondissement of Middleburg, in the province of Zealand, in the kingdom of the Netherlands, with 1376 inhabitants.

AARGAU, or Argovia, one of the cantons of Switzerland. It was originally a part of Berne, but by arrangements begun in 1798, and continued in 1803, it was erected into a separate and independent canton. It is bounded on the north by the river Rhine, which divides it from the duchy of Baden, on the east by Zurich, on the south-east by Zug, on the south by Lucerne, on the south-west by Berne, and on the west by Solothurn and Basle. Its extent is about 600 square miles, and its divisions are into eleven circles, which are again subdivided into forty-eight smaller ones. By the census taken in 1828, the number of inhabitants appeared to be 151,200, and they have increased since that period. In the year 1814 the reformed Protestants were 75,279, and the Catholics 67,000, besides which there were about 1800 Jews.

The greater part of the canton is either level or undulating, but some of the mountains on the right bank of the Aar are of the height of 2700 feet. The chief river is the Rhine, which forms the boundary, and is navigable, though, on account of shoals and rocks, with difficulty. That river receives into it the water of the Aar, the Wigger, the Suren, the Reuss, and the Limmath, as well as that of many smaller brooks and rivulets. The climate is milder than in most parts of Switzerland. In the valley of the Aar figs and almonds ripen, and some wine is produced. The principal occupation is husbandry. The products are corn, wine, and some rape-oil, hemp, flax, potatoes, wood, and turf, and all the common kinds of cattle. Some iron is drawn from the mines by Tegerfelden. The trade consists in the export of corn and wine, and of some cotton and half-cotton goods, silk ribbons, cutlery, leather, straw hats, and some smaller wares.

The legislative power is in the greater council of 150, and the smaller, of 13 members, exercise the executive. These consist of half Catholics and half Protestants. In each circle is an amtman or bailiff, and in each subdivision a justice of the peace, from whom there is an appeal to a supreme court, composed equally of Protestants and Catholics. The contingent of men for the defence of the confederation is 2410, and of money 48,200 francs. The income of the canton is supposed to amount to 500,000 francs, arising from land, salt, and gun-powder monopoly, tolls, and postage. The expenditure is 10,000 francs less than the income.

AARHUUS, one of the sees (*stifts*) into which Denmark is divided. It is in the southernmost part of the peninsula of Jutland. The extent is 1810 square miles, or 1,158,400 acres. It is a level country, somewhat undulating, having on its coasts several indentions forming bays, and in the exterior having several lakes, rivers, low hills, and woods. The climate is considered to be the best in Jutland. The greater part of the inhabitants are engaged in cultivation, and produce more corn, potatoes, and flax, than their consumption requires, and thus leave a portion for exportation. The ecclesiastical bishopric of Aarhuus differs from the political see. The latter is divided into two jurisdictions or bailiwicks, and 22 baronies (*herrerders*) comprehending 7 cities, 253 parishes, and 69 noble domains and dwellings. The inhabitants amount to 91,000, many of whom are occupied in the fisheries, and the females in spinning.

Aarhuus, one of the bailiwicks into which the see of the same name in Denmark is divided. Its extent is 864 square miles, or 558,400 acres, comprehending 2 cities and 134 parishes, divided into 12 baronies, and containing 45,000 inhabitants.

Aarhuus, a city, the capital of the see and of the bailiwick of the same name. It is situated on the Cattegat, in a low plain, where an inland lake empties itself into the sea. The cathedral is a Gothic building, and the largest church in Denmark. It contains 1050 dwelling-houses, and about 7000 inhabitants. The harbour is small, but good and secure; and there are 46 vessels belonging to the city, chiefly in the coasting trade, but lately have gone on voyages to the West Indies. There are some sugar-houses, tanneries, and snuff-mills. The chief exports are corn, wool, and fish. It is in Lat. 56. 9. 35. N. Long. 10. 8. E.

AARON, high-priest of the Jews, and brother to Moses, was by the father's side great-grandson, and by the mother's, grandson of Levi. By God's command he met Moses at the foot of Mount Horeb, and they went together into Egypt to deliver the children of Israel. He had a great share in all that Moses did for their deliverance. The Scriptures call him the prophet of Moses, and he acted in that capacity after the Israelites had passed over the Red Sea. He ascended Mount Sinai with two of his sons, Nadab and Abihu, and seventy elders of the people; but neither he nor they went higher than halfway, from whence they saw the glory of God; only Moses and Joshua went to the top, where they stayed forty days. During their absence, Aaron, overcome by the people's eager entreaties, set up the golden calf, which the Israelites worshipped by his consent. This calf has given rise to various conjectures. Some Rabbis maintain that he did not make the golden calf, but only threw the gold into the fire, to get rid of the importunities of the people; and that certain magicians who mingled with the Israelites at their departure from Egypt, cast this gold into the figure of a calf. According to some authors, the fear of falling a sacrifice to the resentment of the people, by giving a refusal, made Aaron comply with their desire: and they allege also, that he hoped to elude their request, by demanding of the women to contribute their ear-rings; imagining they would rather choose to remain without a visible deity, than be deprived of their personal ornaments. This affair of the golden calf happened in the third month after the Israelites came out of Egypt. In the first month of the following year, Aaron was appointed by God high-priest; which office he executed during the time that the children of Israel continued in the wilderness. He died upon Mount Hor, in the fortieth year after the departure from Egypt, being then 123 years old; A. M. 2522, of the Julian period 3262, before the Christian era 1452.

Aaron, the Caraite, a learned Jew who flourished about the year 1299. He left many works on the Old Testament, among which there is one entitled *A Commentary on the Pentateuch*, which has been much valued. It was written in Hebrew, and printed in folio with a Latin translation, at Jena, in 1710.

Aaron, another Caraite Jew, who lived in the 15th century, wrote a concise Hebrew grammar, entitled *The Perfection of Beauty*, which was printed at Constantinople in 1581.

Aaron and **Julius**, *Saints*, were brothers who suffered martyrdom together, during the persecution under the emperor Dioclesian, in the year 303, about the same time with St Alban the first martyr of Britain. We are not told what their British names were, it being usual with the Christian Britons, at the time of baptism, to take new names from the Greek, Latin, or Hebrew. Nor have we any certainty as to the particulars of their death; only that they suffered the most cruel torments. Two churches were dedicated to the brothers, in which their bodies were interred, at Caer-Leon, the ancient metropolis of Wales.

Aaron, or *Haroun, Al Raschid*, a celebrated caliph, or Mahometan sovereign of the Saracen empire; whose history is given under the article Bagdad.

AARSENS, Francis, Lord of Someldyck and Spyck, one of the greatest negotiators of the United Provinces. He was born at the Hague in 1572. His father, Cornelius Aarsens, was secretary to the States; and being acquainted with Mr Mornay du Plessis, at the court of William prince of Orange, he prevailed upon him to take his son under him, with whom he continued some years. John Olden Barneveldt, who presided over the affairs of Holland and all the United Provinces, sent him afterwards as resident into France, where he learned to negotiate under those profound politicians Henry IV., Villeroy, Jeanin, &c. Soon after, he was invested with the character of ambassador, and was the first who was recognised as such by the French court. He resided in France 15 years; during which time he received great marks of esteem from the king, who created him a knight and baron; and for this reason he was received among the nobles of the province of Holland. However, he became at length so odious to the French court, that they desired to have him recalled. He was afterwards deputed to Venice, and to several German and Italian princes, upon occasion of the troubles in Bohemia. He was the first of three extraordinary ambassadors sent to England in 1620, and the second in 1641; in which latter embassy he was accompanied by the lord of Brederode as first ambassador, and Heemsvliet as third, to negotiate the marriage of Prince William, son of the prince of Orange, with a daughter of Charles I. He was likewise ambassador extraordinary at the French court in 1624, at the beginning of Cardinal Richelieu's administration, who had a high opinion of him. His unpublished memoirs of the negotiations in which he was engaged, show him to have been one of the ablest men of his time, and worthy of the confidence and trust reposed in him by his country. But his character is not altogether without stain. His enmity to the Remonstrants was bitter and unrelenting; and he is supposed to have greatly encouraged the violent measures pursued by Prince Maurice against the venerable Barneveldt, and to have been the principal adviser for assembling the persecuting synod of Dordrecht. He died at a very advanced age; and his son, who survived him, was reputed the wealthiest man in Holland.

AARWANGEN, a market town and chief place of a small bailiwick (Amtsvoigter) in the canton of Berne, in Switzerland.

AASAR, in *Ancient Geography*, a town of Palestine, in the tribe of Judah, situated between Azotus and Ascalon. In Jerome's time it was a hamlet.

AASERALD, a town of 1016 inhabitants, in the bailiwick of Raabygdelauget, and see of Christiansand, in Norway.

AASI, a river called by the ancients sometimes the Orontes, at others the Axius. It issues an insignificant stream from Schebel at Schalk, and vastly increases its water by the Jermut, the Keber, the Esurd, and other rivers that rise on the eastern side of Mount Lebanon. It then passes through the lakes Kades and Epamea, thence takes a south-west course, and, augmented by the water of the lake Antakia, enters the Mediterranean Sea to the southward of Scanderoon.

AASTRUP, a town in the barony of Sonder and bishopric of Laalan, in the island Falster, belonging to Denmark, containing 1033 inhabitants.

AB, the eleventh month of the civil year of the Hebrews, and the fifth of their ecclesiastical year, which begins with the month Nisan. It answers to the moon of July; that is, to part of our month of the same name, and to the beginning of August: it consists of thirty days. The Jews fast on the first of this month, in memory of Aaron's death; and on the ninth, because on that day both the temple of Solomon, and that erected after the captivity, were burnt; the former by the Chaldeans, and the latter by the Romans. The same day is also remarkable among that people for the publication of Adrian's *edict*, wherein they were forbidden to continue in Judea, or even to look back when at a distance from Jerusalem, in order to lament the desolation of that city. The 18th of the same month is also a fast among the Jews; because the lamp in the sanctuary was that night extinguished, in the time of Ahaz.

Ab, in the Syriac calendar, is the name of the last summer month. The first day of this month they called *Suum-Miriam*, the fast of the virgin, because the eastern Christians fasted from that day to the fifteenth, which was therefore called *Fathr-Miriam*, the cessation of the fast of the virgin.

ABA (or rather Abau) Hanifah or Hanfa, surnamed Al-Nooma, was the son of Thabet, and born at Coufah, in the 80th year of the Hegira. He is the most celebrated doctor of the orthodox Mussulmans, and his sect is the most esteemed of the four which they indifferently follow. Almansor caused him to be imprisoned at Bagdad, for having refused to subscribe to the opinion of absolute predestination, which the Mussulmans call Cadha; but afterwards Abou Joseph, who was the sovereign judge or chancellor of the empire under the caliph Hadi, brought his doctrine into such credit, that it became a prevailing opinion, That to be a good Mussulman was to be a Hanifite. He died in the 150th year of the Hegira, in the prison of Bagdad: and it was not till 335 years after his death, that Melick Schah, a sultan of the Selgiucidan race, erected to his memory a magnificent monument in the same city, and a college for his followers, in the 485th year of the Hegira, and anno Christi 1092.

Aba, *Abas, Abos*, or *Abus*, in *Ancient Geography*, the name of a mountain in Greater Armenia, situated between the mountains Niphatos and Nibonis. According to Strabo, the Euphrates and Araxes rose from this mountain; the former running eastward, and the latter westward. It is in N. lat. 39½. and connects at its eastern extremity with Mount Ararat.

Aba. See Abæ.

Aba, Albon, or Ovon, a king of Hungary. He married the sister of Stephen I. and was elected king on the deposition of Peter in 1041. The emperor Henry III. preparing to reinstate Peter on the throne, Aba made an incursion into his dominions, and returned loaded with booty; but was next year obliged to make restitution, by paying a large sum, in order to prevent a threatened invasion from the emperor. He indulged in great familiarity with the lower class of the people; on account of which, and his severity to their order, he became universally odious to the nobility. The fugitive nobles, aided by the emperor, excited a revolt against him. After a bloody battle, Aba was put to flight; and was murdered by his own soldiers in 1044, having reigned three years.

ABACÆNUM, in *Ancient Geography*, a town of Sicily, whose ruins are supposed to be those lying near Trippi, a citadel on a high and steep mountain not far from Messina. The inhabitants were called *Abacænini*.

ABACINARE, or Abbacinare, in writers of the middle age, a cruel species of punishment, consisting in the blinding of the criminal, by holding a red-hot basin or bowl of metal before his eyes.

ABACK (a sea term), the situation of the sails when the surfaces are flatted against the masts by the force of the wind. The sails are said to be *taken aback* when they are brought into this situation, either by a sudden change of the wind, or by an alteration in the ship's course. They are *laid aback*, to effect an immediate retreat, without turning to the right or left; or, in the sea phrase, to give the ship *stern-way*, in order to avoid some danger discovered before her in a narrow channel, or when she has advanced beyond her station in the line of battle, or otherwise. The sails are placed in this position by slackening their lee braces, and hauling in the weather ones; so that the whole effort of the wind is exerted on the fore part of their surface, which readily pushes the ship astern, unless she is restrained by some counteracting force.

ABACOT, the name of an ancient cap of state worn by the kings of England, the upper part whereof was in the form of a double crown.

ABACTORS, or Abactores, a name given to those who drive away, or rather steal, cattle by herds, or great numbers at once; and are therefore very properly distinguished from *fures* or thieves.

ABACUS, among the ancients, was a kind of cupboard or buffet. Livy, describing the luxury into which the Romans degenerated after the conquest of Asia, says they had their *abaci*, beds, &c. plated over with gold.

Abacus, or Abaciscus, in *Architecture*, signifies the superior part or member of the capital of a column, and serves as a kind of crowning to both. Vitruvius tells us the abacus was originally intended to represent a square tile laid over an urn, or rather over a basket. The form of the abacus is not the same in all orders: in the Tuscan, Doric, and Ionic, it is generally square; but in the Corinthian and Composite, its four sides are arched inwards, and embellished in the middle with some ornament, as a rose or other flower. Scammozzi uses *abacus* for a concave moulding on the capital of the Tuscan pedestal; and Palladio calls the plinth above the echinus, or boultin, in the Tuscan and Doric orders, by the same name.

Grecian Abacus.

Abacus is also the name of an ancient instrument for facilitating operations in arithmetic. The exhibition of numbers by counters appears happily fitted for unfolding the principles of calculation. In the schools of ancient Greece, the boys acquired the elements of knowledge by working on a smooth board with a narrow rim,—the *Abax;* so named, evidently, from the combination of Α, Β, Γ, the first letters of their alphabet, resembling, except perhaps in size, the tablet likewise called A, B, C, on which the children with us used to begin to learn the art of reading. The pupils, in those distant ages, were instructed to compute, by forming progressive rows of counters, which, according to the wealth or fancy of the individual, consisted of small pebbles, of round bits of bone or ivory, or even of silver coins. From ψηφος, the Greek word for a *pebble*, comes the verb ψηφιζειν, to *compute*. But the same board served also for teaching the rudiments of writing and the principles of Geometry. The *Abax* being strewed with green sand, the *pulvis eruditus* of classic authors, it was easy, with a *radius* or small rod, to trace letters, draw lines, construct triangles, or describe circles.—Besides the original word Αβαξ, the Greeks had the diminutive Αβακιον; and it seems very probable, that this smaller board was commonly used for calculations, while the larger one was reserved among them for the purpose of tracing geometrical diagrams.

To their calculating board the ancients make frequent allusions. It appears, from the relation of Diogenes Laertius, that the practice of bestowing on pebbles an artificial value, according to the rank or place which they occupied, remounts higher than the age of Solon, the great reformer and legislator of the Athenian commonwealth. This sagacious observer and disinterested statesman, who was, however, no admirer of regal government, used to compare the passive ministers of kings or tyrants to the counters or pebbles of arithmeticians, which are sometimes most important, and at other times quite insignificant.[1] Æschines, in his oration for the Crown, speaking of balanced accounts, says, that *the pebbles were cleared away, and none left.*[1] His rival, Demosthenes, repeating his expression, employs further the verb αντανελειν, which means *to take up as many counters as were laid down.* It is evident, therefore, that the ancients, in keeping their accounts, did not separately draw together the credits and the debts, but set down pebbles for the former, and took up pebbles for the latter. As soon as the board became cleared, the opposite claims were exactly balanced. We may observe, that the phrase *to clear one's scores or accounts*, meaning to settle or adjust them, is still preserved in the popular language of Europe, being suggested by the same practice of reckoning with counters, which prevailed indeed until a comparatively late period.

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[1] *Ελεγε δε τους παρα τοις τυραννοις δυναμενους παραπλησιους ειναι ταις Ψηφοις* ΤΑΙΣ ΕΠΙ ΤΩΝ ΛΟΓΙΣΜΩΝ. *και γαρ εκεινων εκαστην ποτε μεν* ΠΛΕΙΩ *σημαινειν, ποτε δε* ʽΗΤΤΩ. (Diog. Laert. *in Vita Solonis.*)

Roman Abacus.

The Romans borrowed their *Abacus* from the Greeks, and never aspired higher in the pursuit of science. To each pebble or counter required for that board they gave the name of *calculus*, a diminutive formed from *calx, a stone;* and applied the verb *calculare*, to signify the operation of combining or separating such pebbles or counters. Hence innumerable allusions by the Latin authors. *Ponere calculum—subducere calculum, to put down a counter*, or *to take it up;* that is, to add or subtract; *vocare aliquid ad calculum, ut par sit ratio acceptorum et datorum—to submit any thing to calculation, so that the balance of debtor and creditor may be struck.* The emperor Helvius Pertinax, who had been taught, while a boy, the arts of writing and casting accounts, is said, by Julius Capitolinus, to be *litteris elementariis et calculo imbutus.* St Augustine, whose juvenile years were devoted to pleasure and dissipation, acquaints us, in his extraordinary Confessions, that to him no song ever sounded more odious than the repetition or *cantio*, that *one* and *one* make *two*, and *two* and *two* make *four.* The use of the *Abacus*, called sometimes likewise the *Mensa Pythagorica*, formed an essential part of the education of every noble Roman youth:

> Nec qui *abaco numeros, et secto in pulvere metas*
> Scit risisse vafer. PERS. *Sat.* i. 131.

From Martianus Capella we learn that, as refinement advanced, a coloured sand, generally of a greenish hue, was employed to strew the surface of the *abacus.*

> Sic *abacum* perstare jubet, sic *tegmine glauco*
> Pandere pulvereum formarum ductibus æquor.
> Lib. vii. *De Arithmetica.*

A small box or coffer, called a *Loculus*, having compartments for holding the *calculi* or counters, was a necessary appendage of the *abacus.* Instead of carrying a slate and satchel, as in modern times, the Roman boy was accustomed to trudge to school, loaded with his arithmetical board, and his box of counters:

> Quo pueri magnis e centurionibus orti,
> *Lævo suspensi loculos tabulamque lacerto.*
> HORAT. *Sat.* i. 6.

In the progress of luxury, *tali*, or dies made of ivory, were used instead of pebbles, and small silver coins came to supply the place of counters. Under the emperors, every patrician living in a spacious mansion, and indulging in all the pomp and splendour of eastern princes, generally entertained, for various functions, a numerous train of foreign slaves or freedmen in his palace. Of these, the *librarius* or *miniculator*, was employed in teaching the children their letters; but the *notarius* registered expenses, the *rationarius* adjusted and settled accounts, and the *tabularius* or *calculator*, working with his counters and board, performed what computations might be required. Sometimes these laborious combiners of numbers were termed reproachfully *canculones* or *calculones.* In the fervour of operation, their gestures must often have appeared constrained and risible.

> *Computat, ac cevet.* Ponatur calculus, adsint
> Cum tabula pueri.
> JUV. *Sat.* ix. 40.

The nicety acquired in calculation by the Roman youth, was not quite agreeable to the careless and easy temper of Horace.

> Romani pueri *longis rationibus* assem
> Discunt in parteis centum diducere. Dicat
> Filius Albini, Si de quincunce remota est
> Uncia, quid superet? Poteras dixisse, Triens. Eu!
> Rem poteris servare tuam. Redit uncia; quid fit?
> Semis.
> *Epist. ad Pisones.*

It was a practice among the ancients to keep a diary, by marking their fortunate days by a *lapillus*, or small white pebble, and their days of misfortune by a black one. Hence the frequent allusions which occur in the Classics:

> O diem lætum, notandumque mihi *candidissimo calculo!*
> PLIN. *Epist.* vi. 11.
>
> .... diesque nobis
> Signandi *melioribus lapillis!*
> MART. ix. 53.
>
> Hunc, Macrine, diem numera *meliore lapillo*,
> Qui tibi labentes apponit candidus annos.
> PERS. *Sat.* ii. 1, 2.

To facilitate the working by counters, the construction of the *abacus* was afterwards improved. Instead of the perpendicular lines or bars, the board had its surface divided by sets of parallel grooves, by stretched wires, or even by successive rows of holes. It was easy to move small counters in the grooves, to slide perforated beads along the wires, or to stick large nobs or round-headed nails in the different holes. To diminish the number of marks required, every column was surmounted by a shorter one, wherein each counter had the same value as five of the ordinary kind, being half the index of the Denary Scale. The *abacus*, instead of wood, was often, for the sake of convenience and durability, made of metal, frequently brass, and sometimes silver. In the Plate entitled ARITHMETIC, we have copied, from the third volume of the Supplement added by Polenus to the immense Thesaurus of Grævius, two varieties of this instrument, as used by the Romans. They both rest on good authorities, having been delineated from antique monuments,—the first kind by Ursinus, and the second by Marcus Velserus. In the one, the numbers are represented by flattish perforated beads, ranged on parallel wires; and, in the other, they are signified by small round counters moving in parallel grooves. These instruments contain each seven capital bars, expressing in order *units, tens, hundreds, thousands, ten thousands, hundred thousands*, and *millions;* and above them are shorter bars following the same progression, but having five times the relative value. With *four* beads on each of the long wires, and

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[1] *Καν καθαραι ωσιν αἱ Ψηφοι, και μηδεν περιῃ.* (DEMOSTHENES *pro Corona.*)

one bead on every corresponding short wire, it is evident that any number could be expressed, as far as *ten millions*.

In all these, the *Denary Scale* is followed uniformly; but there is, besides, a small appendage to the arrangement founded on the *Duodenary System*. Immediately below the place of units is added a bar, with its corresponding branch, both marked Θ, being designed to signify *ounces*, or the twelfth parts of a pound. *Five* beads on the long wire, and *one* bead on the short wire, equivalent now to *six*, would therefore denote *eleven* ounces. To express the simpler fractions of an ounce, three very short bars are annexed behind the rest; a bead on the one marked S or ʒ, the contraction for *Semissis*, denoting *half an ounce;* a bead on the other, which is marked by the inverted Ɔ, the contraction for *Sicilicum*, signifying the *quarter of an ounce;* and a bead on the last very short bar, marked 2, a contraction for the symbol ƻ or *Binæ Sextulæ*, intimating a *duella* or *two-sixths*, that is, *the third part of an ounce*. The second form of the *abacus* differs in no essential respect from the first, the grooves only supplying the place of parallel wires.

We should observe that the Romans applied the same word *abacus*, to signify an article of luxurious furniture, resembling in shape the arithmetical board, but often highly ornamental, and destined for a very different purpose,—the relaxation and the amusement of the opulent. It was used in a game apparently similar to that of chess, which displayed a lively image of the struggles and vicissitudes of war. The infamous and abandoned Nero took particular delight in this sort of play, and drove along the surface of the abacus with a beautiful *quadriga*, or chariot of ivory.

The civil arts of Rome were communicated to other nations by the tide of victory, and maintained through the vigour and firmness of her imperial sway. But the simpler and more useful improvements survived the wreck of empire, among the various people again restored by fortune to their barbarous independence. In all transactions wherein money was concerned, it was found convenient to follow the procedure of the Abacus, in representing numbers by counters placed in parallel rows. During the middle ages, it became the usual practice over Europe for merchants, auditors of accounts, or judges appointed to decide in matters of revenue, to appear on a covered *bank* or *bench*, so called, from an old Saxon or Franconian word, signifying a *seat*. Hence those terms were afterwards appropriated to offices for receiving pledges, chambers for the accommodation of money-dealers, or courts for the trying of questions respecting property or the claims of the Crown. Hence also the word *bankrupt*, which occurs in all the dialects of Europe. The term *scaccarium*, from which was derived the French, and thence the English name for the *Exchequer*, anciently signified merely a *chess-board*, being formed from *scaccum*, denoting one of the movable pieces in that intricate game. The reason of this application of the term is sufficiently obvious. The table for accounts was, to facilitate the calculations, always covered with a cloth, resembling the surface of the *scaccarium* or *abacus*, and distinguished by perpendicular and *chequered* lines. The learned Skene was therefore mistaken in supposing that the Exchequer derived its name from the play of chess, because its suitors appear to fight a keen and dubious battle.[1]

Exchequer Board, and other Contrivances.

The Court of Exchequer, which takes cognizance of all questions of revenue, was introduced into England by the Norman conquest. Richard Fitznigel, in a treatise or dialogue on the subject, written about the middle of the twelfth century, says that the *scaccarium* was a quadrangular table about ten feet long and five feet broad, with a ledge or border about four inches high, to prevent any thing from rolling over, and was surrounded on all sides by seats for the judges, the tellers, and other officers. It was covered every year, after the term of Easter, with fresh black cloth, divided by perpendicular white lines, or distinctures, at intervals of about a foot or a palm, and again parted by similar transverse lines. In reckoning, they proceeded, he says, according to the rules of arithmetic,[2] using small coins for counters. The lowest bar exhibited *pence*, the one above it *shillings*, the next *pounds;* and the higher bars denoted successively *tens*, *twenties*, *hundreds*, *thousands*, and *ten thousands* of pounds; though, in those early times of penury and severe economy, it very seldom happened that so large a sum as the last ever came to be reckoned. The first bar, therefore, advanced by *dozens*, the second and third by *scores*, and the rest of the stock of bars by the multiples of *ten*. The teller sat about the middle of the table; on his right hand *eleven* pennies were heaped on the first bar, and a pile of *nineteen* shillings on the second; while a quantity of pounds was collected opposite to him, on the third bar. For the sake of expedition, he might employ a different mark to represent half the value of any bar, a silver penny for ten shillings, and a gold penny for ten pounds.

In early times, a chequered board, the emblem of calculation, was hung out, to indicate an office for changing money. It was afterwards adopted as the sign of an inn or *hostelry*, where victuals were sold, or strangers lodged and entertained. We may perceive traces of that ancient practice existing even at present. It is customary in London, and in some provincial towns, to have a chequer, diced with red and white, painted against the sides of the door of a chop-house.

The use of the smaller *abacus* in assisting numerical computation was not unknown during the middle ages. In England, however, it appears to have scarcely entered into actual practice, being mostly confined to those "slender clerks" who, in such a benighted period, passed for men of science and learning. The calculator was styled, in correct Latinity, *abacista;* but, in the Italian dialect, *abbachista*, or *abbachiere*. A different name came afterwards to be imposed. The Arabians, who, under the appellation of Saracens or Moors, conquered Spain, and enriched that insulated country by commendable industry and skill, had likewise introduced their mathematical science. Having adopted a most refined species of numeration, to which they gave the barbarous name of *algarismus*, *algorismus*, or *algorithmus*, from the definite article *al*, and the Greek word *ἀριθμος*, or *number*, this compound term was adopted by the Christians of the West, in their admiration of superior skill, to signify calculation in general, long before the peculiar mode had become known and practised among them. The term *algarism* was corrupted in English into *augrim* or *awgrym*, as printed by Wynkyn de Worde, at the end of the fifteenth century; and applied even to the pebbles or counters used in ordinary calculation. In confirmation of this remark, we shall not scruple to quote a passage from our ancient poet Chaucer, who flourished about a century before, and whose verses, however rude, are sometimes highly graphic.

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[1] "Because mony persons conveenis in the Checker to playe their causes, contrare uthers, as gif they were fechtand in an arrayed battell, quilk is the forme and ordour of the said playe." (SKENE, ad voc. *Scaccarium*.)

[2] He calls it *Arismetica:* In the *Myrrour of the Worlde*, printed by Caxton, in 1481, it is strangely named *Ars Metrike*, a proof of the total ignorance of Greek at that period in England.

> This clerk was cleped hendy Nicholas;
> Of derne love he coude and of solas;
> And therto he was slie and ful prive,
> And like a maiden meke for to se.
> A chambre had he in that hostelrie
> Alone, withouten any compagnie,
> Ful fetisly ydight with herbes sote,
> And he himself was swete as is the rote
> Of licoris, or any setewale.
> His almageste, and bokes gret and smale,
> His astrelabre, longing for his art,
> *His augrim stones, layen faire apart*
> *On shelves couched at his beddes hed,*
> His presse ycovered with a falding red.
> And all above ther lay a gay sautrie,
> On which he made on nightes melodie,
> So swetely, that all the chambre rong:
> And *Angelus ad virginem* he song.
> And after that he song the kinge's note;
> Ful often blessed was his mery throte.
>
> *The Milleres Tale*, v. 13–32.

The *abacus*, with its store of counters, wanted the valuable property of being portable, and was at all times evidently a clumsy and most incommodious implement of calculation. In many cases, it became quite indispensable to adopt some sure and ready method of expressing at

Digital Numeration.

least the lower numbers. The ancients employed the variously combined inflections of the fingers on both hands to signify the numerical series, and on this narrow basis they framed a system of considerable extent. In allusion to the very ancient practice of numbering by the arbitrary play of the fingers, Orontes, the son-in-law of Artaxerxes, having incurred the weighty displeasure of that monarch, is reported by Plutarch to have exclaimed in terms exactly of the same import as those before ascribed to Solon, that "the favourites of kings resemble the fingers of the arithmetician, being sometimes at the top and sometimes at the bottom of the scale, and are equivalent at one time to ten thousand, and at another to mere units."[1]

Among the Romans likewise, the allusions to the mode of expressing numbers by the varied inflection of the fingers, are very frequent. Hence the classical expressions, *computare digitis*, and *numerare per digitos*; and hence the line of Ausonius,

> Quot ter luctatus cum pollice computat index.

In this play of the fingers great dexterity was acquired; and hence the phrase which so frequently occurs in the Classics—*micare digitis*. It was customary to begin with the left hand, and thence proceed to the right hand, on which the different combined inflections indicated exactly one hundred times more. Hence the peculiar force of this passage from Juvenal:

> Rex Pylius, magno si quicquam credis Homero,
> Exemplum vitæ fuit a cornice secundæ;
> Felix nimirum, qui tot per sæcula mortem
> Distulit, atque suos jam *dextra* computat annos.
>
> *Sat.* x. 246–249.

Many such allusions to the mode of indicating numbers by the varied position of the fingers or the hands, occur in the writings of Cicero and Quintilian. The ancients, indeed, for want of better instruments, were tempted to push that curious art to a very great extent. By a single inflection of the fingers of the left hand, they proceeded as far as ten; and by combining another inflection with it, they could advance to an hundred. The same signs on the right hand, being augmented, as we have seen, an hundredfold, carried them as far as ten thousand; and by a further combination, those signs, being referred successively to different parts of the body, were again multiplied an hundred times, and therefore extended to a *million*. This kind of pantomime outlived the subversion of the Roman empire, and was particularly fitted for the slothful religious orders who fattened on its ruins, and, relinquishing every manly pursuit, recommended silence as a virtue, or enjoined it as an obligation. Our venerable Bede has explained the practice of manual numeration at some length; and we have given (see Plate ARITHMETIC) a small specimen of such inflections and digital signs.

These signs were merely fugitive, and it became necessary to adopt other marks, of a permanent nature, for the purpose of recording numbers. But of all the contrivances adopted with this view, the rudest undoubtedly is the method of registering by *tallies*, introduced into England along with the Court of Exchequer, as another badge of the Norman conquest. These consist of straight well-seasoned sticks, of hazel or willow, so called from the French verb *tailler*, to *cut*, because they are squared at each end. The sum of money was marked on the side with notches, by the cutter of tallies, and likewise inscribed on both sides in Roman characters, by the writer of the tallies. The smallest notch signified a penny, a larger one a shilling, and one still larger a pound; but other notches, increasing successively in breadth, were made to denote ten, a hundred, and a thousand. The stick was then cleft through the middle by the deputy-chamberlains, with a knife and a mallet; the one portion being called the *tally*, or sometimes the *scachia*, *stipes*, or *kancia*; and the other portion named the *countertally*, or *folium*.

After the union with Scotland had been concluded in 1707, a store of hazel rods for tallies was sent down to Edinburgh, being intended, no doubt, as a mighty refinement on the Scottish mode of keeping accounts. Their advantages, however, were not perceived or acknowledged, and they have since been suffered, we believe, to lie as so much useless lumber. But the case is very different in England, where a blind and slavish attachment to ancient forms, however ridiculous they may through time have become, is almost constantly opposed to the general progress of society. Were a sensible traveller from India or China to visit our metropolis, and report, on his return home, that a nation highly polished, enlightened, and opulent, yet keep their accounts of the public revenue, surpassing annually many millions of pounds, by means of notches cut on willow rods,—he would certainly not be credited, but supposed to use the licence of substituting a description of the practice of the most savage tribes of the American Continent.

Chinese Swan-Pan

The Chinese have, from the remotest ages, used in all their calculations, an instrument called the *Swan-Pan*, or *Computing Table*, similar in its shape and construction to the *abacus* of the Romans, but more complete and uniform. It consists of a small oblong board surrounded by a high ledge, and parted lengthwise near the top by another ledge. It is then divided vertically by ten smooth and slender rods of bamboo, on which are strung two small balls of ivory or bone in the upper compartment, and five such balls in the lower and larger compartment; each of the latter on the several bars denoting unit, and each of the former, for the sake of abbreviation, expressing five. See Plate (Arithmetic), where the balls are actually set to signify the numbers annexed.

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[1] Καθαπερ οἱ των αριθμητικων ΔΑΚΤΥΛΟΙ νυν μεν ΜΥΡΙΑΔΑΣ, νυν δε ΜΟΝΑΔΑ τιθεναι δυνανται. το αυτο και των βασιλεων φιλους, νυν μεν το παν δυνασθαι, νυν δε τουλαχιστον. (PLUT. *Apophthegm.*)

The system of measures, weights, and coins, which prevails throughout the Chinese empire, being entirely founded on the decimal subdivision, the swan-pan was admirably suited for representing it. The calculator could begin at any particular bar, and reckon with the same facility either upwards or downwards. This advantage of treating fractions exactly like integers was, in practice, of the utmost consequence. Accordingly, those arithmetical machines, but of very different sizes, are constantly used in all the shops and booths of Canton and other cities, and are said to be handled by the native traders with such rapidity and address as quite astonish the European factors.

But the Chinese have also contrived a very neat and simple kind of digital signs for denoting numbers, greatly superior, both in precision and extent, to the method practised by the Romans. Since every finger has three joints, let the thumb-nail of the other hand touch those joints in succession, passing up the one side of the finger, down the middle, and again up the other side, and it will give nine different marks, applicable to the *Denary Scale* of arrangement. On the little finger those marks signify units, on the next finger tens, on the mid-finger hundreds, on the index thousands, and on the thumb hundred thousands. With the combined positions of the joints of the one hand, therefore, it was easy to advance by signs as far as a million. To illustrate more fully this ingenious practice, we have, immediately below the *koua* of the Emperor Fou-hi, copied (See Plate), from a Chinese elementary treatise of education, the figure of a hand, noted at the several joints of each finger, by characters along the inside, corresponding to *one*, *two*, and *three*, down the middle by those answering to *four*, *five*, and *six*, and again up the outside by characters expressing *seven*, *eight*, and *nine*. It is said that the merchants in China are accustomed to conclude bargains with each other by help of those signs; and that often, from selfish or fraudulent views, they conceal the pantomime from the knowledge of by-standers, by only seeming to seize the hand with a hearty grasp. (B.)

Abacus Pythagoricus, the common multiplication table, so called from its being invented by Pythagoras.

Abacus Logisticus is a rectangled triangle, whose sides, forming the right angle, contain the numbers from 1 to 60; and its area, the facta of each two of the numbers perpendicularly opposite. This is also called a *canon of sexagenimals*.

Abacus et Palmulæ, in the *Ancient Music*, denote the machinery whereby the strings of polyplectra, or instruments of many strings, were struck with plectra made of quills.

Abacus Harmonicus is used by Kircher for the structure and disposition of the keys of a musical instrument, whether to be touched with the hands or the feet.

Abacus Major, in metallurgic operations, the name of a trough used in the mines, wherein the ore is washed.

ABADDON, is the name which St John in the Revelation gives to the king of the locusts, the angel of the bottomless pit. The inspired writer says this word is Hebrew, and in Greek signifies a *destroyer*. That angel-king is by some thought to be Satan or the devil; but Mr le Clerc thinks with Dr Hammond, that by the locusts which came out of the abyss, may be understood the zealots and robbers, who miserably afflicted the land of Judea, and laid it in a manner waste, before Jerusalem was taken by the Romans; and that Abaddon, the king of the locusts, may be John of Gischala, who having treacherously left that town a little before it was surrendered to Titus, came to Jerusalem, where he soon headed part of the zealots, who acknowledged him as their king, whilst the rest would not submit to him. This subdivision of the zealot party brought a thousand calamities on the Jews.

ABADIR, a title which the Carthaginians gave to gods of the first order. In the Roman mythology, it is the name of a stone which Saturn swallowed, by the contrivance of his wife Ops, believing it to be his new-born son Jupiter: hence it became the object of religious worship.

ABÆ, or Aba, in *Ancient Geography*, a town of Phocis in Greece, near Helicon; famous for an oracle of Apollo older than that at Delphi, and for a rich temple which was plundered and burnt by the Persians.

ABAFT, a sea term, signifying the hinder part of a ship, or all those parts both within and without which lie towards the stern, in opposition to *afore*. *Abaft* is also used as a preposition, and signifies *farther aft*, or *nearer the stern*: as, the barricade stands *abaft* the main-mast, *i. e.* behind it, or nearer the stern.

ABAGAITOUYES, a village or settlement of Asiatic Russia, in the circle of Nertschinsk and government of Irkuzk. Lat. 49. 34. 19. N. Long. 118. 10. 30. E.

ABAISSED, *abaisse*, in *Heraldry*, an epithet applied to the wings of eagles, &c. when the tip looks downwards to the point of the shield, or when the wings are shut; the natural way of bearing them being extended.

ABAKA, Khan, the eighth emperor of the Moguls, a wise and good prince, ascended the throne in 1264. He reigned 17 years, and is by some authors said to have been a Christian. It may be admitted, indeed, that he joined with the Christians in keeping the feast of Easter, in the city Hamadan, a short time before his death. But this is no proof of his Christianity; it being common, in times of brotherly love, for Christians and Mahometans to join in keeping the same feasts, when each would compliment the other with doing honour to his solemnity.

ABAKANSK, a range of mountains in the government of Tomsk, in Siberia, extending from the river Tom to the Jenisei, parallel to the Altai mountains.

Abakansk, a fortified town of Asiatic Russia, in Siberia, comprehended within the government of Tomsk. It was built in 1707, and has since been fixed on as the seat of the courts of justice. Its population is about 1200 souls. Lat. 54. N. Long. 91. 14. E.

ABALIENATION, in *Law*, the act of transferring one man's property to another.

ABALLABA, the ancient name of Appleby, a town in Westmoreland, remarkable only for its having been a Roman station.

ABALUS, in *Ancient Geography*, is described by the ancients as an island in the German Ocean, where amber was found in great abundance. It was also called Raunonia, and is supposed by Mannert, a learned German writer, to be the narrow peninsula on the Prussian coast which lies betwixt the Baltic and the lakes called the Frisch and Curisch Haffs.

ABANA, or Amana, in *Ancient Geography*, a river of Phœnicia, which, rising from Mount Hermon, passed on the south side of Damascus, and fell into the lake now called Bahr el Margi.

ABANGA. See Ady.

ABANILLA, a town in the province and department of Murcia, in Spain.

ABANO, a town in the Austrian division of Italy, situated under the Euganian hills. It is celebrated for its warm baths, of which there are five, viz. Fonte d'Abano, Mont-Ortone, St Pietro, Monte Gratto, and St Barteolomo, and a mud bath, Bagno di Fango. It contains 2570 inhabitants.

ABANTES, a people who came originally from Thrace, and settled in Phoces, a country of Greece, where they built a town which they called *Aba*, after the name of Abas their leader; and if we may credit some ancient authors, the Abantes went afterwards into the island Eubœa, now called *Negropont:* others say the Abantes of Eubœa came from Athens. The Abantes were a very warlike people, closing with their enemies, and fighting hand to hand.

ABANTIAS, or ABANTIS, in *Ancient Geography*, a name of the island Eubœa in the Egean Sea, extending about 100 miles along the coast of Greece, and separated from Bœotia by a narrow strait called *Euripus*. From its length the island was formerly called *Macris;* afterwards *Abantias* or *Abantis*, from the Abantes, a people originally of Thrace, called by Homer οπιθεν Κομοωντες, from wearing their hair long behind, having in a battle experienced the inconvenience of wearing long hair before. From cutting their hair before, they were called *Curetes*.

ABANY, a market town in the Austrian kingdom of Hungary, in the palatinate of Pest, and in the circle of Recskemet, with one Catholic and one Reformed church.

ABAPTISTON, in *Surgery*, the perforating part of the instrument called a TREPAN. This instrument, which is mentioned by Galen, Fabricius ab Aquapendente, and others, was a conical saw with a circular edge. Modern practitioners, however, prefer the cylindrical form; and various contrivances have been recommended to obviate the danger that may arise from want of dexterity, or from rashness, in performing the operation of trepanning. A new instrument has been lately invented for this purpose. This instrument is so contrived, that it can be fitted to cut any thickness of bone without danger of injuring the brain; and as no pivot or centre pin is necessary, the dreadful accidents which have sometimes happened by not removing it, when the instrument in common use is employed, are completely avoided. (See *Philosoph. Mag. April* 1802.)

ABARAN, a small town in the department of Ziezar, and province of Murcia, in Spain.

ABARCA, an ancient kind of shoe used in Spain for passing the mountains with. It was made of raw hides, and bound with cords, which secured the feet of travellers against the snow.

ABARIM, high mountains of steep ascent separating the country of the Ammonites and Moabites from the land of Canann, where Moses died. According to Josephus, they stood opposite to the territory of Jericho, and were the last station but one of the Israelites coming from Egypt. Nebo and Pisgah were parts of these mountains.

ABARIS, the Hyperborean, a celebrated sage of antiquity, whose history and travels have been the subject of much learned discussion. Such a number of fabulous stories[1] were told of him, that Herodotus himself seems to scruple to relate them. He tells us only,[2] that this barbarian was said to have travelled with an arrow, and to have taken no sustenance; but this does not acquaint us with the marvellous properties which were attributed to that arrow; nor that it had been given him by the Hyperborean Apollo. With regard to the occasion of his leaving his native country, Harpocration[3] tells us, that the whole earth being infested with a deadly plague, Apollo, upon being consulted, gave no other answer than that the Athenians should offer up prayers in behalf of all other nations; upon which, several countries deputed ambassadors to Athens, among whom was Abaris the Hyperborean. In this journey, he renewed the alliance between his countrymen and the inhabitants of the island of Delos. It appears that he also went to Lacedæmon; since according to some writers,[4] he there built a temple consecrated to Proserpine the Salutary. It is asserted, that he was capable of foretelling earthquakes, driving away plagues, laying storms,[5] &c. He wrote several books, as Suidas[6] informs us, viz. Apollo's arrival in the country of the Hyperboreans; the nuptials of the river Hebrus; Θεογονια, or the Generation of the Gods; a collection of oracles, &c.——If the Hebrides, or Western islands of Scotland, (says Mr Toland[7]) were the Hyperboreans of Diodorus,[8] then the celebrated Abaris was of that country; and likewise a Druid, having been the priest of Apollo. Suidas, who knew not the distinction of the insular Hyperboreans, makes him a Scythian; as do some others, misled by the same vulgar error; though Diodorus has truly fixed his country in an island, and not on the continent. Indeed (continues Mr Toland) the fictions and mistakes concerning our Abaris are infinite: however, it is agreed by all that he travelled quite over Greece, and from thence into Italy, where he conversed familiarly with Pythagoras, who favoured him beyond all his disciples, by instructing him in his doctrines (especially his thoughts of nature) in a plainer and more compendious method than he did any other. This distinction could not but be very advantageous to Abaris. The Hyperborean, in return, presented the Samian, as though he equalled Apollo himself in wisdom, with the sacred arrow on which the Greeks have fabulously related[9] that he sat astride, and flew upon it, through the air, over rivers and lakes, forests and mountains; in like manner as our vulgar still believe, particularly those of the Hebrides, that wizards and witches fly whithersoever they please on their broom-sticks. The orator Himerius above mentioned, though one of those who, from the equivocal sense of the word *Hyperborean*, seem to have mistaken Abaris for a Scythian, yet describes his person accurately, and gives him a very noble character. "They relate," says he, "that Abaris the sage was by nation a Hyperborean, appeared a Grecian in speech, and resembled a Scythian in his habit and appearance. He came to Athens holding a bow in his hand, having a quiver hanging on his shoulders, his body wrapt up in a plaid, girt about the loins with a gilded belt, and wearing trousers reaching from his waist downward." By this it is evident (says Mr Toland) that he was not habited like the Scythians, who were always covered with skins; but appeared in the native garb of an aboriginal Scot.

ABARTICULATION, in *Anatomy*, a species of articulation, admitting of a manifest motion; called also *Diarthrosis*, and *Dearticulatio*, to distinguish it from that sort of articulation which admits of a very obscure motion, and is called *Synarthrosis*.

ABAS, a weight used in Persia for weighing pearls. It is one-eighth less than the European carat.

ABAS, in heathen mythology, was the son of Hypothoon and Meganira, who entertained Ceres, and offered a sacrifice to that goddess; but Abas ridiculing the ceremony, and giving her opprobrious language, she sprinkled him with a certain mixture she held in her cup, on which he became a newt or water lizard.

ABASCIA, or ABCASSIA, the northern district of the western division of Georgia, situated on the coast of the Black Sea, and tributary to the Turks. The inhabitants trade in furs, tiger-skins, linen yarn, boxwood, and bees'

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[1] Jamblichi *Vita Pythag.*

[2] Lib. iv. cap. 36.

[3] Under the word Αβαρις.

[4] Pausanias lib. iii. p. 94.

[5] Porphyry in *Vita Pythagor.*

[6] Under the word Αβαρις.

[7] Account of the Druids, in his *Posthumous Works*, vol. i. p. 161.

[8] Diod. Sic. lib. ii. iii.

[9] Jamblichi *Vita Pythag.* p. 128.

wax; but their principal traffic consists in the sale of their own children to the Turks, and to one another. They have the name of Christians, but have nothing left but the name, any more than the Mingrelians their northern neighbours.

ABASSI, or ABASSIS, a silver coin current in Persia, equivalent in value to a French livre, or tenpence halfpenny sterling. It took its name from Schah Abbas II. king of Persia, under whom it was struck.

ABASSUS, in *Ancient Geography*, a town of the Greater Phrygia, on the confines of the Tolistobagii, a people of Galatia in Asia.

ABASTAS, a town in the department of Carrion, and province of Toro, in Spain.

ABATAMENTUM, in *Law*, is an entry to lands by interposition, *i. e.* when a person dies seized, and another who has no right enters before the heir.

ABATE, in the manege, implies the performing any downward motion properly. Thus a horse is said to *abate* or take down his curvets, when he puts both his hind legs to the ground at once, and observes the same exactness in all the times.

To ABATE, (from the French *abattre*, to pull down, overthrow, demolish, batter down, or destroy,) a term used by the writers of the English common law both in an active and neuter sense; as, To *abate* a castle, is to beat it down. To *abate* a writ, is, by some exception, to defeat or overthrow it. A stranger *abateth*; that is, entereth upon a house or land void by the death of him that last possessed it, before the heir takes possession, and so keepeth him out: wherefore, as he that putteth out him in possession is said to disseize, so he that steppeth in between the former possessor and his heir is said to *abate*. In the neuter signification thus: The writ of the demandant shall *abate*; that is, shall be disabled, frustrated, or overthrown. The appeal *abateth* by covin; that is, the accusation is defeated by deceit.

ABATELMENT, in commerce, a term used for a prohibition of trade to all French merchants in the ports of the Levant who will not stand to their bargains, or refuse to pay their debts. It is a sentence of the French consul, which must be taken off before they can sue any person for the payment of their debts.

ABATEMENT, in *Heraldry*, an accidental figure supposed to have been added to coats of arms, in order to denote some dishonourable demeanour or stain, whereby the dignity of coat armour was rendered of less esteem.

ABATIS, an ancient term for an officer of the stables.

ABATIS, or ABATTIS, in military affairs, a kind of defence made of felled trees. In sudden emergencies, the trees are merely laid lengthwise beside each other, with the branches pointed outwards to prevent the approach of the enemy, while the trunks serve as a breast-work to the defendants. When the abatis is employed for the defence of a pass or entrance, the boughs of the trees are stripped of their leaves and pointed, the trunks are planted in the ground, and the branches interwoven with each other.

ABATON, a building at Rhodes, erected as a fence to the trophy of Artemisia, queen of Halicarnassus, Coos, &c. raised in memory of her victory over the Rhodians; or rather to conceal the disgrace of the Rhodians from the eyes of the world; for, to efface or destroy the trophy was with them a point of religion.

ABATOR, in *Law*, a term applied to a person who enters a house or lands void by the death of the last possessor, before the true heir.

ABATOS, in *Ancient Geography*, an island in the lake near Memphis, formerly famous for its papyrus. It was the burial place of Osiris.

ABATSKAJA, a town on the river Tabask, in the circle of Ischim and stadtholdership of Tobolsk, in the Russian dominion of Siberia, in Asia. It may be more properly denominated a township, as the dwellings are scattered about at considerable distance from each other. The houses are 385, and the inhabitants about 2000.

ABAUJVAR, one of the palatinates into which the Austrian kingdom of Hungary is divided. Its extent is about 700,000 acres, nearly one-half of which is in woods, the other half cultivated. It contains one city, 10 market-towns, and 227 villages. The inhabitants were, in 1829, 162,557, mostly Catholics; the remainder Lutherans, Calvinists, and Greek church, with some Jews. The chief productions are corn, flax, hemp, tobacco, fruit, wine, and wood. There are also valuable quarries of marble.

ABAUZIT, FIRMIN, a learned Frenchman, was born at Uses, in Languedoc, in November 1679. His father died when he was but two years of age. To avoid the rigours of persecution to which the Protestants of France were exposed in the time of Louis XIV. young Abauzit's mother, who was a Protestant, fled with her son to Geneva, where he remained secure from danger, and enjoyed the benefit of education. From his 10th to his 19th year, his time was wholly devoted to literature; and having made great progress in languages, he studied mathematics, physics, and theology. In the year 1698, he travelled into Holland, where he became acquainted with Bayle, Basnage, and Jurieu. Thence he passed over to England, and was introduced to Sir Isaac Newton, who entertained a very high opinion of his merit. For this philosopher afterwards sent him his *Commercium Epistolicum*, accompanied with a very honourable testimony: "You are well worthy, says Newton, to judge between Leibnitz and me." The reputation of Abauzit reached the ears of King William, who encouraged him by a very handsome offer to settle in England; which he declined, and returned to Geneva. In 1715 he entered into the society formed for the purpose of translating the New Testament into the French language, and contributed valuable assistance to this work. The chair of philosophy in the university was offered to him in 1723, which he refused; but in 1727 he accepted of the office of librarian to the city, the duties of which were neither burdensome, nor subjected him to any particular restraint.

Abauzit was one of the first who embraced the grand truths which the sublime discoveries of Newton disclosed to the world. He defended the doctrines of that philosopher against Father Castel; and discovered an error in the *Principia*, which was corrected by Newton in the second edition of his work. He was a perfect master of many languages; his knowledge was extensive and profound; and the different sciences which he had studied were so well digested and arranged in his retentive mind, that he could at once bring together all that he ever knew on any subject. Rousseau (in his *Heloise*) addressed to Abauzit one of the finest panegyrics which he ever wrote; and a stranger having addressed Voltaire in a flattering manner, by saying he had come to Geneva to see a great man, the poet asked him whether he had seen Abauzit.

This excellent man, having lived universally respected to the great age of 87 years, died in the year 1767, lamented by the republic, and regretted by the learned.

His writings are chiefly on religious subjects; but he was also the author of several antiquarian and critical pieces. In his Essay on the Apocalypse, he endeavoured to show, that the predictions in that book were to be applied to the destruction of Jerusalem. This work was translated into English by Dr Twells, who added a refutation, which satisfied Abauzit so much that he was mistaken in his views, that he ordered an edition then ready for publication in Holland to be stopped. His other theological works are, Reflections on the Eucharist; On Idolatry; On the Mysteries of Religion; and Paraphrases and Explanations of sundry parts of Scripture. His principal works were published in Holland in 1773, by Berenger, in 2 volumes 8vo. under the title *Œuvres de feu M. Abauzit.*

ABAVO, in *Botany*, a synonyme of the ADANSONIA.

ABB, a term among clothiers applied to the yarn of a weaver's warp. They say also *Abb-wool* in the same sense.

ABBA, in *Ancient Geography*, a town of Africa Propria, near Carthage.

ABBA, in the Syriac and Chaldee languages, literally signifies *a father*; and figuratively, a superior, reputed as a father in respect of age, dignity, or affection. It is more particularly used in the Syriac, Coptic, and Ethiopic churches, as a title given to the bishops. The bishops themselves bestow the title of *Abba* more eminently on the bishop of Alexandria: which occasioned the people to give him the title of *Babba*, or *Papa*, that is *Grandfather*; a title which he bore before the bishop of Rome. It is a Jewish title of honour given to certain Rabbis called *Tanaites:* and it was particularly used, by some writers of the middle age, for the superior of a monastery, usually called ABBOT.

ABBACH, a town of the kingdom of Bavaria, on a stream flowing into the Danube, with a castle, in which the Emperor Henry II. was born. It is in the district of Kellhaim, and circle of Regensburg, with 570 inhabitants.

ABBADIE, JAMES, an eminent Protestant divine, born at Nay in Bern in 1654; first educated there under the famous John la Placette, and afterwards at the university of Sedan, from whence he went into Holland and Germany, and was minister in the French church of Berlin. He left that place in 1690; came into England; was some time minister in the French church in the Savoy, London; and was made dean of Killalo in Ireland. He was strongly attached to the cause of King William, as appears in his elaborate defence of the Revolution, and his History of the *Assassination Plot.* The materials for the last were furnished by the secretaries of state. He had great natural abilities, which he improved by useful learning. He was a most zealous defender of the primitive doctrine of the Protestants, as appears by his writings; and that strong nervous eloquence for which he was so remarkable, enabled him to enforce the doctrines of his profession from the pulpit with great spirit and energy. He possessed uncommon powers of memory. It is said that he composed his works without committing any part to writing, till they were wanted for the press. He died in London in 1727, after his return from a tour in Holland. He published several works in French that were much esteemed: the principal of which are, A Treatise on the Truth of the Christian Religion; The Art of Knowing one's Self; A Defence of the British Nation, that is, of the Revolution 1688; the Deity of Jesus Christ essential to the Christian Religion; The History of the last Conspiracy in England, called the *Assassination Plot*, written by order of King William III.; and the Triumph of Providence and Religion, or the opening the Seven Seals by the Son of God.

ABBAS, Mahomet's uncle, opposed his nephew with all his power, regarding him as an impostor and traitor to his country; but in the second year of the Hegira, being overcome and made a prisoner at the battle of Beder in 623, a great ransom being demanded for him, he represented to Mahomet, that his paying it would reduce him to beggary, which would bring dishonour on the family. Mahomet, who knew that he had concealed large sums of money, said to him, "Where are the purses of gold that you gave your mother to keep when you left Mecca? Abbas, who thought this transaction secret, was much surprised; and conceiving that his nephew was really a prophet, embraced his religion. He became one of his principal captains, and saved his life when in imminent danger at the battle of Honain, against the Thakesites, soon after the reduction of Mecca. But besides being a great commander, Abbas was one of the first doctors of Islamism. He is said to have read lectures on every chapter of the Koran, as his nephew pretended to receive them from heaven. He died in 652, and his memory is held in the highest veneration among the Mussulmans to this day.

ABBAS, *Schah*, the Great, was third son of Codabendi, 7th king of Persia of the race of the Sophis. Succeeding to his father in 1585, at the age of 18, he found the affairs of Persia at a low ebb, occasioned by the conquests of the Turks and Tartars. He regained several of the provinces they had seized; but death put a stop to his victories in 1629, after a reign of 44 years. He was the greatest prince who had reigned in Persia for many ages; and it was he who made Ispahan the metropolis of Persia. His memory is held in the highest veneration among the Persians.

ABBAS, *Schah*, his grandson, 9th king of Persia of the race of the Sophis, succeeded his father Sesi at 13 years of age. He was but 18 when he made himself master of the city of Candahar, which had surrendered in his father's reign to the great Mogul, and all the province about it; and he preserved it afterwards against this Indian emperor, though he besieged it more than once with an army of 300,000 men. He was a very merciful prince, and openly protected the Christians. He had formed a design of extending the limits of his kingdom toward the north, and had for that effect levied a powerful army; but death put a stop to all his great designs, at 37 years of age, A. D. 1666.

ABBASSIDES, the name of a race who possessed the caliphat for 524 years. There were 37 caliphs of this race who succeeded one another without interruption.

ABBATEGGIO, a town in the kingdom of Naples, in the province of Abruzzo Citeriore, with 440 inhabitants.

ABBE', in a monastic sense, the same with ABBOT.

ABBE', in a modern sense, the denomination of a class of persons which has been popular in France. They were not in orders; but having received the ceremony of tonsure, were entitled to enjoy certain privileges in the church. The dress of abbés was that of academics or professed scholars. In colleges they were the instructors of youth, and were employed as tutors in private families. Many of them have risen to a distinguished rank in the state, while others have been no less eminent in science and literature.

ABBEHAUSEN, a bailiwick or circle of Oldenburg, in the duchy of Holstein Oldenburg, in Germany. It contains 1255 houses and 6263 inhabitants. The chief town of the same name has 303 houses and 1502 inhabitants.

ABBESS, the superior of an abbey or convent of nuns. The abbess has the same rights and authority over her nuns that the abbots regular have over their monks. The sex indeed does not allow her to perform the spiritual functions annexed to the priesthood, with which the abbot is usually invested; but there are instances of some abbesses who have a right, or rather a privilege, to commission a priest to act for them. They have even a kind of episcopal jurisdiction, as well as some abbots who are exempted from the visitation of their diocesans.

Martene, in his treatise on the rights of the church, observes, that abbesses formerly confessed nuns; but he adds, that their excessive curiosity carried them such lengths, that there arose a necessity of checking it. However, St Basil, in his Rule, allows the abbess to be present with the priest at the confession of her nuns.

ABBEVILLE, an arrondissement of the department of the Somme, in the north-east of France, which extends over 606 square miles, or 387,840 acres. It is divided into 11 districts and 178 communes, and contains 133,300 inhabitants.

Abbeville, a city, the capital of the arrondissement of that name, through which the river Somme passes. It is strongly fortified, and the country around it can be easily inundated. It is built in the old mode, has several bridges, 4 squares, 14 churches, one of them, St Wulfram's, very antique and curious; 3800 houses, and 20,000 inhabitants. It has long been the seat of the woollen manufacture, besides which there are manufactories for linen, cotton, soap, leather, and twine. The river is navigable by the help of the tides; and by it oil, linseed, and hemp, are exported. It is in Lat. 50. 7. 4. N. Long. 1. 43. 50. E.

ABBEY, a monastery, or religious house, governed by a superior under the title of *abbot* or *abbess*.

Abbeys differ from *priories* in this, that the former are under the direction of an abbot, the latter of a prior; for abbot and prior (we mean a prior conventual) are much the same thing, differing in little but the name.

Fauchet observes, that, in the early days of the French monarchy, dukes and counts were called *abbots*, and duchies and counties *abbeys*. Even some of their kings are mentioned in history under the title of *abbots*. Philip I. Louis VI. and afterwards the duke of Orleans, are called *abbots of the monastery of St Aignan*. The dukes of Aquitain were called *abbots of the monastery of St Hillary at Poictiers*; and the earls of Anjou, *of St Aubin, &c.*

Monasteries were at first established as religious houses, to which persons retired from the bustle of the world to spend their time in solitude and devotion. But they soon degenerated from their original institution, and obtained large privileges, exemptions, and riches. They prevailed greatly in Britain before the Reformation, particularly in England; and as they increased in riches, so the state became poor: for the lands which these regulars possessed were *in mortua manu*, i. e. could never revert to the lords who gave them. This inconvenience gave rise to the statutes against gifts in *mortmain*; and Lord Coke tells us, that several lords, at their creation, had a clause in their grant, that the donor might give or sell his land to whom he would (*exceptis viris religiosis et Judæis*) excepting monks and Jews.

These places were wholly abolished in England at the time of the Reformation; Henry VIII. having first appointed visitors to inquire into the lives of the monks and nuns, which were found in some places to be extremely irregular. The abbots, perceiving their dissolution unavoidable, were induced to resign their houses to the king, who by that means became invested with the abbey lands: these were afterwards granted to different persons, whose descendants enjoy them at this day.

Though the suppression of religious houses, even considered in a political light only, was a national benefit, it must be owned, that at the time they flourished, they were far from useless. Abbeys or monasteries were then the repositories, as well as the seminaries, of learning; many valuable books and national records, as well as private history, having been preserved in their libraries, the only places in which they could have been safely lodged in those turbulent times. Many of those which had escaped the ravages of the Danes, were destroyed with more than Gothic barbarity at the dissolution of the abbeys. These ravages are pathetically lamented by John Bale: "A number of those," says he, "who purchased these superstitious mansions, reserved of the library books, some to serve their jakes, some to scour the candlesticks, and some to rub their boots; some they sold to the grocer and soapseller; and some they sent over sea to the bookbinders, not in small numbers, but in whole ships full; yea, the universities of this realm are not clear of so detestable a fact. I know a merchant that bought the contents of two noble libraries for 40s. price; a shame it is to be spoken! This stuff hath he occupied instead of gray paper, by the space of more than these ten years, and yet he hath store enough for as many years to come. I shall judge this to be true, and utter it with heaviness, that neither the Britons under the Romans and Saxons, nor yet the English people under the Danes and Normans, had ever such damage of their learned monuments as we have seen in our time."

Every abbey had at least one person whose office it was to instruct youth; and the historians of this country are chiefly beholden to the monks for the knowledge they have of former national events. In these houses also the arts of painting, architecture, and printing, were cultivated. They were hospitals for the sick and poor, and afforded entertainment to travellers at a time when there were no inns. They were likewise an asylum for aged and indigent persons of good family.

ABBEYBOYLE, a town of Ireland, in the county of Roscommon, and province of Connaught. It is remarkable for an old abbey. The population in 1831 was 3433.

ABBEYHOLM, a town in Cumberland, so called from an abbey built there by David king of Scots. It stands on an arm of the sea. The population in 1831 was 861.

ABBIATE GRAFFO, a town in the Austrian delegation of Pavia, in Italy. It is situated on the great Naviglio, where that river divides into three branches. It contains 4000 inhabitants, who cultivate around the place large portions of rice.

ABBOT, or Abbat, the superior of a monastery of monks erected into an abbey or priory

The name *Abbot* is originally Hebrew, where it signifies *father*. The Jews call *father*, in their language, *Ab*; whence the Chaldeans and Syrians formed *Abba*; thence the Greeks Αϐϐας, which the Latins retained; and hence our *Abbot*, the French *Abbé*, &c. St Mark and St Paul use the Syriac *Abba* in their Greek, by reason it was then commonly known in the synagogues and the primitive assemblies of the Christians; adding to it, by way of interpretation, the word *father*, Αϐϐα ὁ πατηρ. "Abba, father;" *q. d.* Abba, that is to say, Father. But the name Ab, or Abba, which at first was a term of tenderness and affection, became at length a title of dignity and honour. The Jewish doctors affected it; and one of their most ancient books, containing the sayings or apophthegms of divers of them, is entitled Pirke *Abboth* or Avoth; *i. e.* Chapters of the Fathers. It was in allusion to this affectation, that Jesus Christ forbade his disciples to call any man their father on earth; which word St Jerome turns against the superiors of the monasteries of his time, for assuming the titles of *Abbots*, or Fathers.

The name *Abbot*, then, appears as old as the institution of monks itself. The governors of the primitive monasteries assumed indifferently the titles *Abbots* and *Archimandrites*. They were really distinguished from the clergy; though frequently confounded with them, because a degree above laymen.

In those early days, the abbots were subject to the bishops and the ordinary pastors. Their monasteries being remote from cities, built in the farthest solitudes, they had no share in ecclesiastical affairs. They went on Sundays to the parish church with the rest of the people; or, if they were too remote, a priest was sent them to administer the sacraments; till at length they were allowed to have priests of their own body. The abbot or archimandrite himself was usually the priest: but his function extended no farther than to the spiritual assistance of his monastery; and he remained still in obedience to the bishop. There being among the abbots several persons of learning, they made a vigorous opposition to the rising heresies of those times; which first occasioned the bishops to call them out of their deserts, and fix them about the suburbs of cities, and at length in the cities themselves; from which era their degeneracy is to be dated. Then the abbots threw off their former plainness and simplicity, assumed the rank of prelates, aspired at being independent of the bishops, and grasped at so much power, that severe laws were made against them at the council of Chalcedon. Many of them, however, carried the point of independency, obtained the appellation of *lord*, and were distinguished by other badges of the episcopate, particularly the mitre.

Hence arose new distinctions between the abbots. Those were termed *mitred* abbots, who were privileged to wear the mitre, and exercise episcopal authority within their respective precincts; being exempted from the jurisdiction of the bishop. Others were called *croziered* abbots, from their bearing the crosier or pastoral staff. Others were styled *ecumenical* or universal abbots, in imitation of the patriarch of Constantinople: while others were termed *cardinal* abbots, from their superiority over all other abbots. In Britain, the mitred abbots were lords of parliament, and called abbots-sovereign, and abbots-general, to distinguish them from the other abbots. And as there were lords-abbots, so there were also lords-priors, who had exempt jurisdiction, and were likewise lords of parliament.

In Roman Catholic countries, the principal distinctions observed between abbots are those of *regular* and *commendatory*. The former take the vow and wear the habit of their order; whereas the latter are seculars who have received tonsure, but are obliged by their bulls to take orders when of proper age.

Anciently the ceremony of creating an abbot consisted in clothing him with the habit called *cuculus*, or cowl; putting the pastoral staff into his hand, and the shoes called *pedales* on his feet: but at present, it is only a simple benediction, improperly called, by some, consecration.

ABBOT is also a title given to others beside the superiors of monasteries: thus bishops whose sees were formerly abbeys, are called abbots. Among the Genoese, the chief magistrate of the republic formerly bore the title of *abbot* of the people.

ABBOT, *George*, archbishop of Canterbury, was born October 29. 1562, at Guildford in Surrey. He was the son of Maurice Abbot, a cloth-worker. He studied at Oxford, and in 1597 was chosen principal of University college. In 1599, he was installed dean of Winchester: the year following he was chosen vice-chancellor of the university of Oxford, and a second time in 1603. In 1604, the translation of the Bible now in use was begun by the direction of King James; and Dr Abbot was the second of eight divines of Oxford, to whom the care of translating the whole New Testament (excepting the Epistles) was committed. The year following, he was a third time vice-chancellor. In 1608, he went to Scotland with George Hume earl of Dunbar, to assist in establishing an union between the churches of Scotland and England; and in this business he conducted himself with so much address and prudence, that it laid the foundation of all his future preferment. King James ever after paid great deference to his advice and counsel; and upon the death of Dr Overton, bishop of Litchfield and Coventry, he named Dr Abbot for his successor, who was accordingly constituted bishop of those two united sees in December 1609. About a month afterwards he was translated to the see of London, and on the second of November following was raised to the archiepiscopal see.

It is not however improbable, that his extravagant adulation of his royal master, in which he went as far as any other court chaplain could do, contributed not a little to his rapid preferment. In the preface to a pamphlet which he published, the following specimen of ridiculous flattery occurs: Speaking of the king, he says, "whose life hath been so immaculate and unspotted, &c. that even malice itself, which leaves nothing unsearched, could never find true blemish in it, nor cast probable aspersion on it.—Zealous as a David; learned and wise, the *Solomon* of our age; religious as Josias; careful of spreading Christ's faith as Constantine the Great; just as Moses; undefiled in all his ways as a Jehoshaphat and Hezekiah; full of clemency as another Theodosius."—Yet, as we shall immediately see, Abbot could sometimes oppose the will of the sovereign with courage and constancy.

His great zeal for the Protestant religion made him a strenuous promoter of the match between the Elector Palatine and the Princess Elizabeth; which was accordingly concluded and solemnized the 14th of February 1612, the archbishop performing the ceremony on a stage erected in the royal chapel. In the following year happened the famous case of divorce between the lady Frances Howard, daughter of the earl of Suffolk, and Robert earl of Essex; which has been considered as one of the greatest blemishes of King James's reign. The part which the archbishop took in the business added much to the reputation he had already acquired for incorruptible integrity. It was referred by the king to a court of delegates, whose opinion the king and court wished and expected to be favourable to the divorce. But the archbishop, unawed by royal authority, with inflexible firmness resisted it, and published his reasons for persisting in his opinion; to which the king, disappointed in his views, thought fit to reply: Sentence was given in the lady's favour. In 1618, the king published a declaration, which he ordered to be read in all churches, permitting sports and pastimes on the Lord's day: this gave great uneasiness to the archbishop, who happening to be at Croydon on the day it was ordered to be read, had the courage to forbid it.

Being now in a declining state of health, the archbishop used in the summer to go to Hampshire for the sake of recreation; and being invited by Lord Zouch to hunt in his park at Bramzill, he met there with the greatest misfortune that ever befell him; for he accidentally killed the game-keeper by an arrow from a cross-bow which he shot at one of the deer. This fatal accident threw him into a deep melancholy; and he ever afterwards kept a monthly fast on Tuesday, the day on which it happened; and he settled an annuity of L.20 on the widow.[1] Advantage was taken of this misfortune, to lessen him in the king's favour; but his majesty said, "An angel might have miscarried in this sort." His enemies alleging that he had incurred an irregularity, and was thereby incapacitated for performing the offices of a primate, the king directed a commission to ten persons to inquire into this matter. The result was not satisfactory to his Grace's enemies; it being declared, that, as the murder was involuntary, he had not forfeited his archiepiscopal character.

The archbishop after this seldom assisted at the coun-

[1] Fuller's *Church Hist.* cent. xxvii. p. 87.

cil, being chiefly hindered by his infirmities; but in the king's last illness he was sent for, and constantly attended till his majesty expired on the 27th of March 1622. He performed the ceremony of the coronation of King Charles I. though very infirm and distressed with the gout. He was never greatly in this king's favour; and the duke of Buckingham being his declared enemy, watched an opportunity of making him feel the weight of his displeasure. This he at last accomplished, upon the archbishop's refusing to license a sermon, preached by Dr Sibthorpe to justify a loan which the king had demanded, and pregnant with principles which tended to overthrow the constitution. The archbishop was immediately after suspended from all his functions as primate; and they were exercised by certain bishops commissioned by the king, of whom Laud, the archbishop's enemy, and afterwards his successor, was one; while the only cause assigned for this procedure was, that the archbishop could not at that time personally attend those services which were otherwise proper for his cognizance and direction. He did not, however, remain long in this situation; for a parliament being absolutely necessary, his Grace was sent for, and restored to his authority and jurisdiction. But not proving friendly to certain rigorous measures adopted by the prevailing church party, headed by Laud, whose power and interest at court were now very considerable, his presence became unwelcome there; so that, upon the birth of the prince of Wales, afterwards Charles II., Laud had the honour to baptize him, as dean of the chapel. The archbishop being worn out with cares and infirmities, died at Croydon, the 5th of August 1633, aged 71 years; and was buried at Guildford, the place of his nativity, where he had endowed an hospital with lands to the amount of L.300 per annum. A stately monument was erected over the grave, with his effigy in his robes.

He proved himself, in most circumstances of his life, to be a man of great moderation to all parties; and was desirous that the clergy should gain the respect of the laity by the sanctity and purity of their manners, rather than claim it as due to their function. His opinions and principles, however, have drawn upon him many severe reflections; particularly from the earl of Clarendon. But Dr Welwood has done more justice to his merit and abilities.[1] The following is a list of his works, as given in Chalmers's *Biographical Dictionary*:—1. Quæstiones Sex, totidem prælectionibus in Schola Theologica Oxoniæ, pro forma habitis, discussæ et disceptatæ anno 1597, in quibus e Sacra Scriptura et Patribus, quid statuendum sit definitur. Oxon. 1598, 4to. 2. Exposition on the Prophet Jonah, contained in certain Sermons preached in St Marie's Church in Oxford. 1600, 4to. 3. Answer to the Questions of the Citizens of London in January 1600, concerning Cheapside Cross; not printed until 1641. 4. The Reasons which Dr Hill hath brought for the upholding of Papistry unmasked, and showed to be very weak, &c. Oxon. 1604, 4to. 5. A Preface to the Examination of George Sprot, &c. 6. Sermon preached at Westminster, May 26. 1608, at the funeral of Thomas Earl of Dorset, late Lord High Treasurer of England, on Isaiah xl. 6. 1608, 4to. 7. Translation of a part of the New Testament, with the rest of the Oxford divines. 1611. 8. Some Memorials, touching the Nullity between the Earl of Essex and his Lady, pronounced September 25. 1613, at Lambeth; and the difficulties endured in the same. 9. A Brief Description of the whole World, wherein is particularly described all the Monarchies, Empires, and Kingdoms of the same, with their Academies, &c. 1617, 4to. 10. A short Apology for Archbishop Abbot, touching the death of Peter Hawkins, dated October 8. 1621. 11. Treatise of perpetual Visibility and Succession of the true Church in all ages. Lond. 1624, 4to.; published without his name; but his arms, impaled with those of Canterbury, are put before it. 12. A Narrative containing the true cause of his sequestration and disgrace at Court; in two parts; written at Ford, in Kent, 1627, printed in Rushworth's Historical Collections, vol. i. p. 438–461, and in the Annals of King Charles, p. 213–224. 13. History of the Massacre in the Valteline, printed in the third volume of Fox's Acts and Monuments. 14. Judgment on bowing at the Name of Jesus. Hamburgh, 1632, 8vo.

Abbot, *Robert*, elder brother to the former, was born at Guildford in 1560, and completed his studies at Baliol college, Oxford. In 1582, he took his degree of master of arts, and soon became a celebrated preacher; and to this talent he chiefly owed his preferment. Upon the first sermon at Worcester, he was chosen lecturer in that city, and soon after rector of All-saints in the same place. In 1597, he took his degree of doctor in divinity: and, in the beginning of King James's reign, was appointed chaplain in ordinary to his majesty; who had such an opinion of him as a writer, that he ordered the doctor's book *De Antichristo* to be printed, with his own commentary upon part of the Apocalypse. In 1609, he was elected master of Baliol college; which trust he discharged with the utmost care and assiduity, by his frequent lectures to the scholars, by his continual presence at public exercises, and by promoting temperance in the society. In November 1610, he was made prebendary of Normanton in the church of Southwell; and, in 1612, his majesty appointed him regius professor of divinity at Oxford. The fame of his lectures became very great; and those which he gave upon the supreme power of kings, against Bellarmine and Suarez, so much pleased his majesty, that when the see of Salisbury became vacant, he named him to that bishopric, and he was consecrated by his own brother at Lambeth, December 3. 1615. When he came to Salisbury, he found the cathedral falling to decay, through the avarice and negligence of the clergy belonging to it; however, he found means to draw five hundred pounds from the prebendaries, which he applied towards repairing it. Here he devoted himself to the duties of his function with great diligence and assiduity, visiting his whole diocese in person, and preaching every Sunday. But his sedentary life, and close application to study, brought upon him the gravel and stone; of which he died on the 2d of March 1618, in the 58th year of his age; having filled the see only two years and three months. He wrote, 1. The Mirror of Popish Subtleties. Lond. 1594, 4to. 2. The Exaltation of the Kingdom and Priesthood of Christ, sermons on the first seven verses of the 110th Psalm. Lond. 1601, 4to. 3. Antichristi Demonstratio, contra Fabulas Pontificias, et ineptam Rob. Bellarmini de Antichristo Disputationem. Lond. 1603, 4to. 4. Defence of the Reformed Catholic of Mr W. Perkins, against the Bastard Counter-Catholic of Dr William Bishop, Seminary Priest; in three parts. 1606, 4to. 5. The Old Way; a Sermon at St Mary's, Oxon. Lond. 1610, 4to. 6. The true ancient Roman Catholic; being an Apology against Dr Bishop's Reproof of the Defence of the Reformed Catholic. 1611, 4to. 7. Antilogia; adversus Apologiam Andreæ Eudæmon-Johannis, Jesuitæ, pro Henrico Garnetto, Jesuita Proditore. Lond. 1613, 4to. 8. De Gratia et Perseverantia Sanctorum, Exercitationes habitæ in Academia Oxon. Lond. 1618, 4to. 9. In Ricardi Thomsoni Angli-Belgici Diatribam, de Amissione et Intercessione Justificationis et Gratiæ, Animadversio brevis. Lond. 1618, 4to. 10. De Suprema Potestate Regia, Exercitationes habitæ in Academia Oxoniensi, contra Rob. Bellarminum et Franciscum Suarez. Lond. 1619, 4to.

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[1] *Memoirs*, 8vo. 1700, p. 38.

ABBOTS-BROMLEY, or PAGET'S BROMLEY, a town in Staffordshire, consisting of one long street of well-built houses, with the town-hall in the centre. There is a good free-school, and a spacious church. The population amounted in 1811 to 1019, in 1821 to 1533, and in 1831 to 1621.

ABBOTSBURY, a parish and market-town of Dorsetshire, situated on the coast. The abbey near this town was founded by a Norman lady, about the year 1026. The inhabitants are chiefly occupied in fishing; and in 1811 amounted to 812, in 1821 to 907, and in 1831 to 874.

ABBOTS-LANGLEY, a village of Herts, four miles from St Albans, famous as the birth-place of Pope Adrian IV. The inhabitants amounted in 1811 to 1313, in 1821 to 1733, and in 1831 to 1980.

ABBREVIATION, or ABBREVIATURE, a contraction of a word or passage, made by dropping some of the letters, or by substituting certain marks or characters in their place. A late philosophical writer on grammar divides the parts of speech into words which are necessary for the communication of thought, as the noun and verb, and *abbreviations* which are employed for the sake of dispatch. The latter, strictly speaking, are also parts of speech, because they are all useful in language, and each has a different manner of signification. Mr Tooke, however, seems to allow that rank only to the necessary words, and to consider all others as merely substitutes of the first sort, under the title of abbreviations. They are employed in language in three ways—in terms, in sorts of words, and in construction. Mr Locke in his *Essay on the Human Understanding* treats of the first class; numerous authors have written on the last; and for the second class of abbreviations, see the work of Mr Tooke entitled *Diversions of Purley*. Lawyers, physicians, &c. use many abbreviations, for the sake of expedition. But the Rabbis are the most remarkable for this practice, so that their writings are unintelligible without the Hebrew abbreviatures. The Jewish authors and copyists do not content themselves with abbreviating words like the Greeks and Latins, by retrenching some of the letters or syllables; they frequently take away all but the initial letters. They even take the initials of several succeeding words, join them together, and, adding vowels to them, make a sort of barbarous words, representative of all those which they have thus abridged. Thus, *Rabbi Moses ben Maimon*, in their abbreviature, is *Rambam*, &c.

The following ABBREVIATIONS *are of most frequent occurrence in the Writings and Inscriptions of the Romans.*

A.

AB. Abdicavit.
AB. AUG. M. P. XXXXI. Ab Augusta millia passuum quadraginta unum.
AB. AUGUSTOB. M. P. X. Ab Augustobriga millia passuum decem.
ABN. Abnepos.
AB. U. C. Ab urbe condita.
A. CAMB. M. P. XI. A Camboduno millia passuum undecim.
A. COMPL. XIIII. A Compluto quatuordecim.
A. C. P. VI. A capite *vel* ad caput pedes sex.
A. D. Ante diem.
ADJECT. H-S. IX. ∞. Adjectis sestertiis novem mille.
ADN. Adnepos.
ADQ. Adquiescit, *vel* adquisita *pro* acquisita.
ÆD. II. Π. VIR. II. Ædilis iterum, duumvir iterum.
ÆD. II. VIR. QUINQ. Ædilis duumvir quinquennalis.
ÆD. Q. II. VIR. Ædilis quinquennalis duumvir.
ÆL. Ælius, Ælia.
ÆM. *vel* AIM. Æmilius, Æmilia.
A. G. Animo grato, *vel* Aulus Gellius.
AG. Ager, *vel* Agrippa.
A. K. Ante kalendas.
ALA. I. Ala prima.
A. MILL. XXXV. A milliariis triginta quinque, *vel* ad milliaria triginta quinque.
A. M. XX. Ad milliare vigesimum.
AN. A. V. C. Anno ab urbe condita.
AN. C. H. S. Annorum centum hic situs est.
AN. DCLX. Anno sexcentesimo sexagesimo.
AN. II. S. Annos duos semis.
AN. IVL. Annos quadraginta sex.
AN. N. Annos natus.
ANN. LIII. H. S. E. Annorum quinquaginta trium hic situs est.
ANN. NAT. LXVI. Annos natus sexaginta sex.
ANN. PL. M. X. Annos *vel* annis plus minus decem.
AN. Θ. XVI. Anno defunctus decimo sexto.
AN. V. XX. Annos vixit viginti.
AN. P. M. Annorum plus minus.
A. XII. Annis duodecim.
AN. P. M. L. Annorum plus minus quinquaginta.
A. XX. H. EST. Annorum viginti hic est.
AN. P. R. C. Anno post Romam conditam.
AN. V. P. M. II. Annis vixit plus minus duobus.
AN. XXV. STIP. VIII. Annorum viginti quinque stipendiorum octo.
A. P. M. Amico posuit monumentum.
AP. Appia, Appius.
A. P. V. C. Anno post urbem conditam.
APVD. L. V. CONV. Apud lapidem quintum convenerunt.
A. RET. P. III. S. Ante retro pedes tres semis.
AR. P. Aram posuit.
ARG. P. X. Argenti pondo decem.
ARR. Arrius.
A. V. B. A viro bono.
A. V. C. Ab urbe condita.

B.

B. Balbus, Bulbius, Brutus, Belenus, Burrus.
B. Beneficiario, beneficium, bonus.
B. Balnea, beatus, bustum.
B *pro* V, berna *pro* verna, bixit *pro* vixit, bibo *pro* vivo, bictor *pro* victor, bidua *pro* vidua.
B. A. Bixit annis, bonus ager, bonus amabilis, bona aurea, bonum aureum, bonis auguriis, bonis auspiciis.
B. B. Bona bona, bene bene.
B. DD. Bonis deabus.
B. F. Bona fide, bona femina, bona fortuna, bene factum.
B. F. *reversed thus*, ꓭ. Ⅎ. Bona femina, bona filia.
B. H. Bona hereditaria, bonorum hereditas.
B. I. I. Boni judicis judicium.
B. L. Bona lex.
B. M. P. Bene merito posuit.
B. M. P. C. Bene merito ponendum curavit.
B. M. S. C. Bene merito sepulcrum condidit.
BN. EM. Bonorum emptores.
BN. H. I. Bona hic invenies.
B. RP. N. Bono reipublicæ natus.
B. A. Bixit, *id est*, vixit annis.
BIGINTI. Viginti.
BIXIT. BIXSIT. BISSIT. Vixit.
BIX. ANN. XXCI. M. IV. D. VII. Vixit annis octoginta unum, mensibus quatuor, diebus septem.
BX. ANVS. VII. ME. VI. DI. XVII. Vixit annos septem, menses sex, dies septemdecim.

C.

C. Cæsar, Caia, Caius, censor, civitas, consul, condemno.
C. C. Carissimæ conjugi, calumniae causa, consilium cepit.
C. C. F. Caius Caii filius.
C. B. Commune bonum.
C. D. Comitialibus diebus.
C. H. Custos hortorum *vel* heredum.
C. I. C. Caius Julius Cæsar.
CC. VV. Clarissimi viri.
CEN. Censor, centuria, centurio.
CERTA. QUINQ. ROM. CO. Certamen quinquennale Romæ conditum.
CL. Claudius.
CL. V. Clarissimus vir.
CH. COH. Cohors.
C. M. *vel* CA. M. Causa mortis.
CN. Cneus.
C. O. Civitas omnis.
COH. I. *vel* II. Cohors prima *vel* secunda.
COS. ITER. ET. TERT. DESIG. Consul iterum et tertium designatus.
COS. TER. *vel* QUAR. Consul tertium *vel* quartum.
COSS. Consules.
COST. CUM. LOC. H-S. ∞. D. Custodiam cum loco sestertiis mille quingentis.
C. R. Civis Romanus.
CS. IP. Cæsar imperator.
C. V. Centumviri.

D

D. Decius, decimus, decuria, decurio, dedicavit, dedit, devotus, dies, divus, Deus, dii, Dominus, domus, donum, datum, decretum, &c.
D. A. Divus Augustus.
D. B. I. Diis bene juvantibus.
D. B. S. De bonis suis.
DCT. Detractum.
DDVIT. Dedicavit.
D. D. Dono dedit, Deus dedit, decurionum decreto.
D. D. D. Datum decreto decurionum.
D. D. D. D. Dignum Deo donum dedicavit.
DDPP. Depositi.
D. D. Q. O. H. L. S. E. V. Diis deabusque omnibus hunc locum sacrum esse voluit.
DIG. M. Dignus memoria.
D. M. S. Diis manibus sacrum.
D. O. M. Deo optimo maximo.
D. O. Æ. Deo optimo æterno.
D. PP. Deo perpetuo.
DR. Drusus.
DR. P. Dare promittit.
D. RM. De Romanis.
D. RP. De republica.
D. S. P. F. C. De sua pecunia faciendum curavit.
DT. Duntaxat.
DVL. *vel* DOL. Dulcissimus.
DEC.*XIII. AVG. XII. POP. XI. Decurionibus denariis tredecim, augustalibus duodecim, populo undecim.
D. IIII. ID. Die quarta idus.
D. VIIII. Diebus novem.
D. V. ID. Die quinta idus.

E.

E. Ejus, ergo, esse, est, erexit, exactum, &c.
E. C. F. Ejus causa fecit.
E. D. Ejus domus.
ED. Edictum.
E. E. Ex edicto.
EE. N. P. Esse non potest.
EG. Egit, egregius.
E. H. Ejus heres.
EID. Idus.
EIM. Ejusmodi.
E. L. Ea lege.
E. M. Elexit *vel* erexit monumentum.
EQ. M. Equitum magister.
EQ. O. Equester ordo.
EX. A. D. K. Ex ante diem kalendas.
EX. A. D. V. K. DEC. AD. PRID. K. IAN. Ex ante diem quintum kalendas Decembris ad pridie kalendas Januarias.
EX. H-S. X. P. F. I. Ex sestertiis decem parvis fieri jussit.
EX. H-S. CIↃ. N. Ex sestertiis mille nummum.
EX. H-S. ∞ ∞ ∞ ∞. Ex sestertiis quatuor millia.
EX. H-S. N. CC. L. ∞. D. XL. Ex sestertiis nummorum ducentis quinquaginta millibus quingentis quadraginta.
EX. H-S. DC. ∞. D. XX. Ex sestertiis sexcentis millibus quingentis viginti.
EX. KAL. IAN. AD. KAL. IAN. Ex kalendis Januarii ad kalendas Januarii.

F.

F. Fabius, fecit, factum, faciendum, familia, famula, fastus, Februarius, feliciter, felix, fides, fieri, fit, femina, filia, filius, frater, finis, flamen, forum, fluvius, faustum, fuit.
F. A. Filio amantissimo, *vel* filiæ amantissimæ.
F. AN. X. F. C. Filio *vel* filiæ annorum decem faciendum curavit.
F. C. Fieri *vel* faciendum curavit, fidei commissum.
F. D. Flamen Dialis, filius dedit, factum dedicavit.
F. D. Fidejussor, fundum.
FEA. Femina.
FF. C. Ferme centum.
F. F. Fabre factum, filius familias, fratris filius
F. F. F. Ferro, flamma, fame; fortior, fortuna, fato.
FF. Fecerunt.
FL. F. Flavii filius.
F. FQ. Filiis filiabusque.
FIX. ANN. XXXIX. M. I. D. VI. HOR. SCIT. NEM. Vixit annos triginta novem, mensem unum, dies sex, horas scit nemo.
FO. FR. Forum.
F. R. Forum Romanum.

G.

G. Gellius, Gaius *pro* Caius, genius, gens, gaudium, gesta, gratia, gratis, &c.
GAB. Gabinius.
GAL. Gallus, Galerius.
G. C. Genio civitatis.
GEN. P. R. Genio populi Romani.
GL. Gloria.
GL. S. Gallus Sempronius.
GN. Gneus *pro* Cneus, genius, gens.
GNT. Gentes.
GRA. Gracchus.
GRC. Græcus.

H.

H. Hic, habet, hastatus, heres, homo, hora, hostis, herus.
H. A. Hoc anno.
HA. Hadrianus.
HC. Hunc, huic, hic.
HER. Heres, hereditatis, Herennius.
HER. *vel* HERC. S. Herculi sacrum.
H. M. E. H-S. CCIↃↃ. CCIↃↃ. IↃↃ. N. Hoc monumentum erexit sestertiis viginti quinque mille nummum.
H. M. AD. H. N. T. Hoc monumentum ad heredes non transit.
H. O. Hostis occisus.
HOSS. Hostes.
H. S. Hic situs *vel* sita, sepultus *vel* sepulta.
H-S. N. IIII. Sestertiis nummum quatuor.

H-S. CCCC. Sestertiis quatuor centum.

H-S. ∞. N. Sestertiis mille nummum.

H-S. ∞. CCIƆƆ. N. Sestertiis novem mille nummum.

H-S. CCIƆƆ. CCIƆƆ. Sestertiis viginti mille.

H-S. XX. M. N. Sestertiis viginti mille nummum.

H. SS. Hic suprascriptis.

I.

I. Junius, Julius, Jupiter, ibi, immortalis, imperator, inferi, inter, invenit, invictus, ipse, iterum, judex, jussit, jus, &c.

IA. Intra

I. AG. In agro.

I. AGL. In angulo.

IAD. Jamdudum.

IAN. Janus.

IA. RI. Jam respondi.

I. C. Juris consultus, Julius Cæsar, judex cognitionum.

IC. Hic.

I. D. Inferis diis, Jovi dedicatum, Isidi deæ, jussu Dei.

ID. Idus.

I. D. M. Jovi Deo magno.

I. F. *vel* I. FO. In foro.

IF. Interfuit. IFT. Interfuerunt.

I. FNT. In fronte.

IG. Igitur.

I. H. Jacet hic.

I. I. In jure.

IM. Imago, immortalis, imperator.

I. M. CT. In medio civitatis.

IMM. Immolavit, immortalis, immunis

IM. S. Impensis suis.

IN. Inimicus, inscripsit, interea.

IN. A. P. XX. In agro pedes viginti.

IN. *vel* INL. V. I. S. Inlustris vir infra scriptus.

I. R. Jovi regi, Junoni reginæ, jure rogavit.

I. S. *vel* I. SN. In senatum.

I. V. Justus vir.

IVD. Judicium.

IVV. Juventus, Juvenalis.

II. V. Duumvir, *vel* duumviri.

III. V. *vel* III. VIR. Triumvir, *vel* triumviri.

IIII. VIR. Quatuorvir, *vel* quatuorviri, *vel* quatuorviratus.

IIIIII. V. *vel* VIR. Sextumvir, *vel* sevir, *vel* sexvir.

IDNE. *vel* IND. *aut* INDICT. Indictione *vel* indictio.

K.

K. Cæso, Caius, Caio, Cælius, Carolus, calumnia, candidatus, caput, carissimus, clarissimus, castra, cohors, Carthago, &c.

K. KAL. KL. KLD. KLEND. Kalendæ, *aut* kalendis ; *et sic de cæteris ubi mensium apponuntur nomina.*

KARC. Carcer.

KK. Carissimi.

KM. Carissimus.

K. S. Carus suis.

KR. Chorus.

KR. AM. N. Carus amicus noster.

L.

L. Lucius, Lucia, Lælius, Lollius, lares, Latinus, latum, legavit, lex, legio, libens *vel* lubens, liber, libera, libertus, liberta, libra, locavit, &c.

L. A. Lex alia.

LA. C. Latini coloni.

L. A. D. Locus alteri datus.

L. AG. Lex agraria.

L. AN. Lucius Anius, *vel* quinquaginta annis.

L. AP. Ludi Apollinares.

LAT. P. VIII. E. S. Latum pedes octo et semis.

LONG. P. VII. L. P. III. Longum pedes septem, latum pedes tres.

L. ADQ. Locus adquisitus.

LB. Libertus, liberi.

L. D. D. D. Locus datus decreto decurionum.

LECTIST. Lectisternium.

LEG. I. Legio prima.

L. E. D. Lege ejus damnatus.

LEG. PROV. Legatus provinciæ.

LIC. Licinius.

LICT. Lictor.

LL. Libentissime, liberi, libertas.

L. L. Sestertius magnus.

LVD. SÆC. Ludi sæculares.

LVPERC. Lupercalia.

LV. P. F. Ludos publicos fecit.

M.

M. Marcus, Marca, Martius, Mutius, maceria, magister, magistratus, magnus, manes, mancipium, marmoreus, Marti, mater, maximus, memor, memoria, mensis, meus, miles, militavit, militia, mille, missus, monumentum, mortuus, &c.

MAG. EQ. Magister equitum.

MAR. VLT. Mars ultor.

MAX. POT. Maximus pontifex.

MD. Mandatum.

MED. Medicus, medius.

MER. Mercurius, mercator.

MERK. Mercurialia, mercatus.

MES. VII. DIEB. XI. Mensibus septem, diebus undecim.

M. I. Maximo Jovi, matri Ideæ *vel* Isidi, militiæ jus, monumentum jussit.

MIL. COH. Miles cohortis.

MIN. *vel* MINER. Minerva.

M. MON. MNT. MONET. Moneta.

M. *vel* MS. Mensis *vel* menses.

MNF. Manifestus.

MNM. Manumissus.

M. P. II. Millia passuum duo.

MV. MN. MVN. MVNIC. Municipium, *vel* municeps.

N.

N. Neptunus, Numerius, Numeria, nonis, Nero, nam, non, natus, natio, nefastus, nepos, neptis, niger, nomen, nonæ, noster, numerarius, numerator, numerus, nummus *vel* numisma, numen.

NAV. Navis.

N. B. Numeravit bivus, *pro* vivus.

NB. *vel* NBL. Nobilis.

N. C. Nero Cæsar, *vel* Nero Claudius.

NEG. *vel* NEGOT. Negotiator.

NEP. S. Neptuno sacrum.

N. F. N. Nobili familia natus.

N. L. Non liquet, non licet, non longe, nominis Latini.

N. M. Nonius Macrinus, non malum, non minus.

NN. Nostri. NNR. *vel* NR. Nostrorum.

NO. Nobis.

NOBR. November.

NON. AP. Nonis Aprilis.

NQ. Namque, nusquam. nunquam.

N. V. N. D. N. P. O. Neque vendetur, neque donabitur, neque pignori obligabitur.

NVP. Nuptiæ.

O.

O. Officium, optimus, olla, omnis, optio, ordo, ossa, ostendit, &c.

OB. Obiit.

OB. C. S. Ob cives servatos.

OCT. Octavianus, October.

O. E. B. Q. C. Ossa ejus bene quiescant condita.

O. H. F. Omnibus honoribus functus.

ONA. Omnia.

Abbreviations.

OO. Omnes, omnino. O. O. Optimus ordo.
OP. Oppidum, opiter, oportet, optimus, opus.
ORN. Ornamentum.
OTIM. Optimæ.

P.

P. Publius, passus, patria, pecunia, pedes, perpetuus, pius, plebs, populus, pontifex, posuit, potestas, præses, prætor, pridie, pro, post, provincia, puer, publicus, publice, primus, &c.
PA. Pater, patricius.
PAE. ET. ARR. COS. Pæto et Arrio consulibus.
P. A. F. A. Postulo an fias auctor.
PAR. Parens, Parilia, Parthicus.
PAT. PAT. Pater patriæ.
PBLC. Publicus.
PC. Procurator.
P. C. Post consulatum, patres conscripti, patronus coloniæ, ponendum curavit, præfectus corporis, pactum conventum.
PED. CXV. S. Pedes centum quindecim semis.
PEG. Peregrinus.
P. II. ∞. L. Pondo duarum semis librarum.
P. II. S : :. Pondo duo semis cum triente.
P. KAL. Pridie kalendas.
POM. Pompeïus.
P. P. P. C. Propria pecunia ponendum curavit.
P. R. C. A. DCCCXLIIII. Post Romam conditam annis octingentis quadraginta quatuor.
PROC. Proconsul. P. PR. Proprætor. P. PRR. Proprætores.
PR. N. Pronepos.
P. R. V. X. Populi Romani vota decennalia.
PS. Passus, plebiscitum.
PUD. Pudicus, pudica, pudor.
PUR. Purpureus.

Q.

Q. Quinquennalis, quartus, quintus, quando, quantum, qui, quæ, quod, Quintus, Quintius, Quintilianus, quæstor, quadratum, quæsitus.
Q. B. AN. XXX. Qui bixit, *id est*, vixit, annos triginta.
QM. Quomodo, quem, quoniam.
QQ. Quinquennalis. QQ. V. Quoquo versum.
Q. R. Quæstor reipublicæ.
Q. V. A. III. M. II. Qui *vel* quæ vixit annos tres, menses duo.

R.

R. Roma, Romanus, rex, reges, Regulus, rationalis, Ravennæ, recta, recto, requietorium, retro, rostra, rudera, &c.
RC. Rescriptum.
R. C. Romana civitas.
REF. C. Reficiendum curavit.
REG. Regio.
RP. RESP. Respublica.
RET. P. XX. Retro pedes viginti.
REQ. Requiescit.
RMS. Romanus.
ROB. Robigalia, Robigo.
RS. Responsum.
RVF. Rufus.

S.

S. Sacrum, sacellum, scriptus, semis, senatus, sepultus, sepulcrum, sanctus, servus, serva, Servius, sequitur, sibi, situs, solvit, sub, stipendium, &c.
SAC. Sacerdos, sacrificium.
SÆ. *vel* SÆC. Sæculum, sæculares.
SAL. Salus.
S. C. Senatus consultum.
SCI. Scipio.
S. D. Sacrum diis.
S. EQ. Q. O. ET. P. R. Senatus equesterque ordo et populus Romanus.
SEMP. Sempronius.
SL. SVL. SYL. Sylla.
S. L. Sacer ludus, sine lingua.
S. M. Sacrum manibus, sine manibus, sine malo.
SN. Senatus, sententia, sine.
S. P. Sine pecunia.
S. P. Q. R. Senatus populusque Romanus.
S. P. D. Salutem plurimam dicit.
S. T. A. Sine *vel* sub tutoris auctoritate.
SLT. Scilicet.
S. E. T. L. Sit ei terra levis.
SIC. V. SIC. X. Sicuti quinquennalia, sic decennalia.
SSTVP. XVIIII. Stipendiis novemdecim.
ST. XXXV. Stipendiis triginta quinque.

Abbreviations.

T.

T. Titus, Tullius, tantum, terra, tibi, ter, testamentum, titulus, terminus, triarius, tribunus, turma, tutor, tutela, &c.
TAB. Tabula. TABVL. Tabularius.
TAR. Tarquinius.
TB. D. F. Tibi dulcissimo filio.
TB. PL. Tribunus plebis.
TB. TI. TIB. Tiberius.
T. F. Titus Flavius, Titi filius.
THR. Thrax.
T. L. Titus Livius, Titi libertus.
TIT. Titulus.
TM. Terminus, thermæ.
TR. PO. Tribunitia potestas.
TRAJ. Trajanus.
TUL. Tullus *vel* Tullius.
TR. V. Triumvir.
TT. QTS. Titus Quintus.
Θ. *vel* TH. AN. Mortuus anno.
Θ. XIII. Defunctus viginti tribus.
⋈

V.

V. Quinque, quinto, quintum.
V. Vitellius, Volera, Volero, Volusus, Vopiscus, vale, valeo, Vesta, vestalis, vestis, vester, veteranus, vir, virgo, vivus, vixit, votum, vovit, urbs, usus, uxor, victus, victor, &c.
V. A. Veterano assignatum.
V. A. I. D. XI. Vixit annum unum, dies undecim.
V. A. L. Vixit annos quinquaginta.
V. B. A. Viri boni arbitratu.
V. C. Vale conjux, vivens curavit, vir consularis, vir clarissimus, quintum consul.
VDL. Videlicet.
V. E. Vir egregius, visum est, verum etiam.
VESP. Vespasianus.
VI. V. Sextumvir. VII. V. Septemvir. VIII. VIR. octumvir.
VIX. A. FF. C. Vixit annos ferme centum.
VIX. AN. ⋈. Vixit annos triginta.
⋈
⋈
ULPS. Ulpianus, Ulpius.
V. M. Vir magnificus, vivens mandavit, volens merito.
V. N. Quinto nonas.
V. MUN. Vias munivit.
VOL. Volcania, Voltinia, Volusus.
VONE. Bonæ.
VOT. V. Votis quinquennalibus.
VOT. V. MULT. X. Votis quinquennalibus, multis decennalibus.
VOT. X. Vota decennalia.

VOT. XX. *vel* XXX. *vel* XXXX. Vota vicennalia, aut tricennalia, aut quadragenalia.
V. R. Urbs Roma, votum reddidit.
VV. CC. Viri clarissimi.
UX. Uxor.

X.

X. AN. Decennalibus.
X. K. OCT. Decimo kalendas Octobris.
X. M. Decem millia. X. P. Decem pondo.
X. V. Decemvir. XV. VIR. Quindecimvir.

ABBREVIATORS, a college of 72 persons in the chancery of Rome, who draw up the pope's brieves, and reduce petitions, when granted by him, into proper form for being converted into bulls.

ABBS, St, a promontory on the eastern coast of Scotland, Lat. 55. 55. N. Long. 2. 8. 30. W. The shore around is steep and rocky, and there is a depth of 30 or 40 fathoms water not far from land. The tide runs by it with a strong current, and a little wind causes a great rolling sea.

ABBUTALS signify the buttings or boundings of land towards any point. Limits were anciently distinguished by artificial hillocks, which were called *botemines;* and hence *butting.* In a description of the site of land, the sides on the breadth are more properly *adjacentes,* and those terminating the length are *abbutantes;* which, in old surveys, were sometimes expressed by *capitare,* to head; whence abbutals are now called *head-lands.*

ABCEDARY, or Abcedarian, an epithet given to compositions, the parts of which are disposed in the order of the letters of the alphabet: thus we say, Abcedarian psalms, lamentations, hymns, &c.; such are Psal. xxv. xxxiv. cxix. &c.

ABCHASIEN, a province of the Asiatic Russian empire, on the border of the Black Sea, comprehended between Lat. 42. 30. and 44. 45. N., and between Long. 37. 3. and 40. 36. E. The high mountains of Caucasus on the north and north-west divide it from Circassia; on the south-west it is bounded by Mingrelia; and on the south, south-west, and north-west by the Black Sea. The extent is about 5080 square miles. The climate is generally mild, being defended from the northerly winds by the lofty range of mountains. The sea-coast is in many parts a sandy soil; but in many of the vallies which run up between the projections of the Caucasus the land is fertile, but better adapted for pasturage than for the growth of corn; and hence the greater part of the inhabitants are in the pastoral state. The grape and all other fruits come to perfection. Under the Turkish dominion the trifling commerce was with the Asiatic provinces of that power; but its course is now changed, and passes towards the north. The number of inhabitants is estimated at 56,500, of whom 40,000 are aboriginal. The Turcomans, Nogay Tartars, with the Greeks, Armenians, and Jews that occupy the towns and ports on the coast, are reckoned to be 15,000, and the Russians and Cossacks 1500. In early times the Abchasiens were heathens, but adopted Christianity under the Emperor Justinian, who built a church to the Virgin Mary in 550, and sent missionaries. Under the Turks their Christianity gradually disappeared; and at present the higher classes adhere to Mahomedanism, whilst the mass of the people follow each a separate species of idolatry. Though by the peace of 1812 Russia entered into all the rights enjoyed by the Turks, it scarcely interfered with the interior authority of the several chiefs, who by force gain the superiority; nor does it draw any revenue from the country, but is satisfied with possession of a few commanding fortresses, and with the trade which falls into the new channels from the effect of the political changes.

ABDALLA, the son of Abdalmotalleb, was the father of the prophet Mahomet. He was the most beautiful and modest of the Arabian youth; and when he married Amina, of the noble race of the Zahrites, 200 virgins are said to have died of jealousy and despair. Several other Arabians of eminence bore the same name.

ABDALLATIF, or Abdollatiph, a celebrated physician and traveller, and one of the most voluminous writers of the East, was born at Bagdad, in the 557th year of the Hegira, being the 1161st of the Christian era. Of the life of this learned person there has fortunately been preserved a memoir, written by himself, together with some additions by a contemporary biographer, named Osaiba. The whole of this curious piece has been translated into French, and published with a work of Abdallatif's, of which we shall afterwards give some account. Long before the period of his birth, the empire of the Caliphs had begun to decline; but their capital still continued to enjoy those advantages for education which it had originally derived from their liberal patronage of learning and science. Abdallatif was carefully instructed in every branch of knowledge then taught in that renowned city; and the biographical piece just alluded to is not a little interesting, from the glimpses it affords of the studies which engaged the attention of the more aspiring of the Mussulman youth.

After learning to read, the rules of grammar appear to have been studied with a degree of care and earnestness, which has not perhaps been equalled in any other country. With the study of grammar was joined that of the Koran and the traditionary doctrines, and the whole of the sacred book was carefully committed to memory. This faculty seems, indeed, to have been severely taxed; for it was also thought necessary to be able to repeat several treatises on grammar and jurisprudence, besides some of the choicer collections of Arabian poetry. In these arduous exercises, Abdallatif says that he was for a considerable time accustomed to pass the greater part of the night.

Having attained to great proficiency in the usual studies, he afterwards applied to the natural philosophy of that day, and to medicine; and with the view of still further improving himself by converse with the learned of other places, he set out, when in his twenty-eighth year, to Mosul in Mesopotamia. Having resided about a year in this city, he next proceeded to Damascus, then a place of great resort to the learned of the surrounding countries. Abdallatif found here many of the most eminent men of that age, part of whom were busied in the chimerical pursuits of the Hermetic art, and part in philological and speculative inquiries. He seems always to have entertained great contempt for the sort of chemistry then in vogue, but he entered with eagerness into speculative discussions; and he at this time composed a treatise upon the Divine essence and attributes, in consequence of some discussions with Alkendi, a philosopher of eminence, who was not, however, thought to be quite orthodox in his faith.

The active curiosity of Abdallatif was next directed to Egypt; and he accordingly proceeded to Acre, where its sultan, the great Saladin, was at the time encamped, in order to solicit his permission to visit that country. This monarch was a liberal protector of the learned, and fond of their conversation; but having been lately defeated by the crusaders under Richard Cœur de Lion, he was too much occupied with the cares consequent upon this disaster, to admit Abdallatif to the expected honour of a personal interview. He was, however, received in a courteous manner by the Vizier Al Fadhel, whom he found in his tent writing and dictating at the same time to two secretaries; employments which he continued whilst he conversed with his visitor upon sundry points of grammar and philology. Having obtained the necessary credentials from this minister, he proceeded to Cairo; and the munificence which Saladin and his courtiers extended towards the learned, was strikingly exemplified in his reception and treatment in that city. He was provided with a house, with provisions, and money; and the vizier seldom failed to recommend him anew, in those letters of business which he had occasion to write to the governor of the place.

Here Abdallatif enjoyed the long wished for opportunity of conversing with that *Eagle of the Doctors*, as he was called, the celebrated Maimonides, who had been for a considerable time settled in Egypt, and was physician to the sultan. Here, too, he was fortunate enough to meet with a sage, who weaned him of his admiration for the writings of Avicenna, by pointing out the superior value of the ancients. But the philosophers of Grand Cairo were not all of this stamp; for some of them were pretenders to the transmutation of metals, and one boasted that his art enabled him to fabricate a tent of the waters of the Nile. Having passed a considerable time in making various observations and collections in this interesting city, Abdallatif set out for Jerusalem, on learning that he would there see Saladin, who had at length concluded a truce with the crusaders.

Saladin received him with every mark of respect for his talents, and bestowed upon him a pension. He was then busied in repairing the walls of the Holy City, himself, says Abdallatif, often carrying stones upon his shoulders, to animate the undertaking. But in spite of all his cares and projects, he daily conversed with the learned men whom his bounty had drawn around him. Abdallatif mentions, that when first introduced, he found him in the midst of a circle of this description; and he adds, that upon all the various subjects which were discussed, the sultan spoke with the most agreeable address, as well as ingenuity. From Jerusalem, Abdallatif returned to Damascus; and, after a considerable interval, a fresh opportunity having occurred of revisiting Egypt, he again proceeded to Cairo, where he taught medicine and philosophy for several years.

During this period, Egypt was visited with a terrible famine and pestilence, of which, and the horrors and crimes which ensued, he has given a most appalling description in the two last chapters of his Account of this country. Human nature was scarcely ever presented to observation under so hideous an aspect; the wretched Egyptians were driven, not only to feed upon the bodies of those who had fallen victims to want or disease, but to seize upon children, whom they killed and devoured; and Abdallatif asserts, that they thus came to acquire such a relish for those inhuman repasts, that they with difficulty refrained from them after the famine had subsided. It was likewise during his second stay in Egypt that he witnessed an insane attempt to pull down the Pyramids; a project to which the reigning sultan (a son of Saladin's, who, after his death, succeeded to this part of his dominions) had been instigated by some of his favourites, and in which he persisted for eight months, without being able to make any sensible impression upon these indestructible monuments of the ancient world.

About the year 1207, Abdallatif left Egypt for his former residence, Damascus; and here he for some time practised as a physician, and lectured upon medicine with great success. But his love of new scenes, and desire of extending his knowledge and fame, still urged him to travel; and he seems to have passed the rest of his life in Aleppo, and various parts of Armenia and Asia Minor, acquiring both wealth and glory by his abilities as a physician and an author. Having returned to his native city, purposing to present some of his works to the caliph, and then to set out on a pilgrimage to Mecca, he was seized with illness soon after his arrival, and died there in the year 1231.

He was undoubtedly a person of great knowledge, and of an ardent, inquisitive, and penetrating mind. According to his Arabian biographer, to whom he was well known, he showed himself, in conversation, somewhat vain of his own attainments; and was accustomed to speak rather scornfully of most of his contemporaries. But it ought to be mentioned, to the credit of his understanding, that his derision seems partly to have flowed from his contempt of those chemical fooleries to which they were so much addicted, that, to use the words of Gibbon, "the reason and the fortune of thousands were evaporated in the crucibles of Alchemy."

Of that long list of treatises on medicine, philosophy, and literature, which Osaiba has appended to the account of Abdallatif's life, one only has found its way into Europe; nor do any of the others appear to be known at this day in the East. The work here alluded to is his *Account of Egypt*, which was fortunately discovered and brought to this country by our celebrated orientalist Pococke. The manuscript, which is a very old one, is still preserved in the Bodleian Library. Of this work, an elegant edition, with a Latin translation, notes, and a life of Abdallatif, was published in 1800, by Dr White, professor of Arabic in the University of Oxford. A French translation, with enlarged notes, was published at Paris in 1810, by M. Silvestre de Sacy; and to this, among other valuable illustrations, is appended a translation from an Arabic manuscript, of the curious biographical memoir to which we have above alluded.

This account of Egypt consists of two books; the first of which, in six chapters, gives a general view of the country, of its plants, animals, antiquities, buildings, and modes of navigating on the Nile; and the second, in three chapters, treats at large of this river, and of that terrible famine already mentioned, which was occasioned by a failure in the usual annual increase of its waters. The book undoubtedly is, upon the whole, one of the most interesting productions which has come to us from the East; inasmuch as it presents us with a detailed and authentic view of the state of Egypt during the middle ages, and thus supplies a link which was wanting between the accounts of ancient and of modern times.

See *Abdollatiphi Historiæ Ægypti Compendium, Arabice et Latine*, Lond. 1800, 4to. *Relation de l'Egypte, par Abdallatif*, traduit par M. Silvestre de Sacy, de l'Institut de France. Paris, 1810, 4to.

ABDALMALEK, the son of Mirvan, and the fifth caliph of the race of the Ommiades. He surpassed all his predecessors in power and dominion; for in his reign the Indies were conquered in the east, and his armies penetrated Spain in the west: he likewise extended his empire toward the south, by making himself master of Medina and Mecca. Under his reign the Greek language and character were excluded from the accounts of the public revenue. If this change, says Gibbon, was productive of the invention or familiar use of the Arabic or Indian ciphers, which are our present numerals, a regulation of office has promoted the most important discoveries of arithmetic, algebra, and the mathematical sciences. He began his reign in the 65th of the Hegira, A. D. 684;

reigned 15 years; and four of his sons successively enjoyed the caliphate.

Abdalmalek. See Avenzoar.

ABDALONYMUS, or Abdolonymus, in classic history, of the royal family of Sidon, and descended from King Cinyras, lived in obscurity, and subsisted by cultivating a garden, while Strato was in possession of the crown of Sidon. Alexander the Great having deposed Strato, inquired whether any of the race of Cinyras was living, that he might set him on the throne. It was generally thought that the whole race was extinct; but at last Abdalonymus was thought of, and mentioned to Alexander, who immediately ordered some of his soldiers to fetch him. They found the good man at work, happy in his poverty, and entirely a stranger to the noise of arms, with which all Asia was at that time disturbed; and they could scarcely persuade him they were in earnest. Alexander was convinced of his high descent by the dignity of his person; and not only bestowed on him all that belonged to Strato, but augmented his dominions, and gave him a large present out of the Persian spoils.

ABDALS, in the eastern countries, a kind of saints supposed to be inspired to a degree of madness. The word is perhaps derived from the Arabic, *Abdallah*, the servant of God. Hurried on by excess of zeal, especially in the Indies, they often run about the streets, and kill all they meet who are of a different religion. The English sailors call this *running a muck*, from the name of the instrument, a sort of poniard, which they employ on those desperate occasions. If they are killed, as it commonly happens before they have done much mischief, they reckon it highly meritorious; and are esteemed, by the vulgar, martyrs for their faith.

ABDERA, in *Ancient Geography*, a maritime town of Thrace, not far from the mouth of the river Nessus, on the east side. The Abderites, or Abderitani, were very much derided for their want of wit and judgment: yet their city has given birth to several eminent persons; as Protagoras, Democritus, Anaxarchus, Hecatæus the historian, Nicenætus the poet, and many others, who were mentioned among the illustrious men. In the reign of Lysimachus, Abdera was afflicted for some months with a most extraordinary disease:[1] this was a burning fever, whose crisis was always on the seventh day, and then it left them; but it so distracted their imaginations, that they fancied themselves players. After this, they were ever repeating verses from some tragedy, and particularly from the Andromeda of Euripides, as if they had been upon the stage; so that many of these pale meagre actors were pouring forth their tragic exclamations in every street. This delirium continued till the winter following; which was a very cold one, and therefore fitter to remove it. Lucian, who has described this disease, endeavours to account for it in this manner: Archelaus, an excellent player, acted the Andromeda of Euripides before the Abderites, in the height of a very hot summer. Several had a fever at their coming out of the theatre; and as their imaginations were full of the tragedy, the delirium which the fever raised perpetually represented Andromeda, Perseus, Medusa, &c. and the several dramatic incidents, and called up the ideas of those objects, and the pleasure of the representation, so strongly, that they could not forbear imitating Archelaus's action and declamation: And from these the fever spread to others by infection.

ABDERAHMA, a Saracen viceroy in Spain, who revolted and formed an independent principality at Cordova. He had several successors of the same name. A viceroy and captain-general of this name led the Saracens and their followers into France, ravaging the country wherever they came. At length he was met at Tours by Charles Martel, who had received reinforcements of Germans and Gepidæ; and after many skirmishes, the Saracen army, in a general action, was totally routed, and Abderahma was killed, with 370,000 Moors. This great event, which first broke the power of the Saracens, and taught the Europeans that they were not invincible, happened about the year 732 of the Christian era, and of the Hegira 114.

ABDEST, a Persian word, properly signifying the water placed in a basin for washing the hands; but it is used to imply the legal purifications practised by the Mahometans before prayer, entering the mosque, or reading the Alcoran.

ABDIAS of Babylon, one of the boldest legend-writers, who boasted that he had seen Christ, that he was one of the 70 disciples, had been eye-witness of the actions and prayers of several of the apostles at their deaths, and had followed into Persia St Simon and St Jude, who, he said, made him the first bishop of Babylon. His book, entitled *Historia Certaminis Apostolici*, was published by Wolfgang Lazius, at Basil, 1551; and has passed through several editions in other places.

ABDICATION, the action whereby a person in office renounces and gives up the same before the term of service is expired.

This word is frequently confounded with *resignation*; but differs from it: for abdication is done purely and simply, whereas resignation is in favour of some third person. In this sense, Dioclesian is said to have abdicated the crown; Philip IV. of Spain resigned it. It is said to be a renunciation, quitting, and relinquishing, so as to have nothing further to do with a thing; or the doing of such actions as are inconsistent with the holding of it. On King James's leaving the kingdom, and abdicating the government, the lords proposed that the word *desertion* should be employed; but the commons thought that it was not sufficiently comprehensive. Among the Roman writers it is more particularly used for the act whereby a father discarded or disclaimed his son, and expelled him the family. It is distinguished from *exheredatio* or *disinheriting*, in that the former was done in the father's lifetime; the latter, by will at his death: so that whoever was abdicated, was also disinherited; but not *vice versa*.

ABDOMEN, in *Anatomy*, is that part of the trunk of the body which lies between the thorax and the bottom of the pelvis.

ABDOMINALIS, or Abdominal Fishes, constitute the Fourth Order of the *Fourth Class* of Animals, in the Linnæan system.

ABDON, an island of the India Sea, of the Papuan group, to the north of Wageeoo. It is not more than three or four miles in circumference, is scarcely cultivated, the few inhabitants subsisting chiefly by the fishery. Lat. 0. 30. N. Long. 131. 15. E.

ABDUCTION, in *Logic*, a kind of argumentation, by the Greeks called *apagoge*, wherein the greater extreme is evidently contained in the medium, but the medium not so evidently in the lesser extreme as not to require some further medium or proof to make it appear. It is called *abduction*, because, from the conclusion, it draws us on to prove the proposition assumed. Thus, in the syllogism, "All whom God absolves are free from sin; but God absolves all who are in Christ; therefore all who are in Christ are free from sin,"—the major is evident; but the minor, or assumption, is not so evident without some other proposition to prove it, as, "God received full satisfaction for sin by the sufferings of Jesus Christ."

[1] Lucianus, *quomodo Hist. sit conscribenda initio.*

ABDUCTOR, or Adducent, in *Anatomy*, a name given to several of the muscles, on account of their serving to withdraw, open, or pull back the parts to which they belong.

ABDULPOOR, a town in the centre of the southern Indian peninsula, in the province of Beeder, 20 miles north-west from Hyderabad, in Lat. 17. 12. N. Long. 76. 41. E.

ABEJAR, a town in the province of Soria, in Old Castile, in Spain.

ABEL, second son of Adam and Eve, was a shepherd. He offered to God some of the firstlings of his flock, at the same time that his brother Cain offered the fruits of the earth. God was pleased with Abel's oblation, but displeased with Cain's; which so exasperated the latter, that he rose up against his brother and killed him. These are the only circumstances Moses relates of him. It is remarkable, that the Greek churches, who celebrate the feasts of every other patriarch and prophet, have not done the same honour to Abel. His name is not to be found in any catalogue of saints or martyrs till the 10th century; nor even in the new Roman martyrology. However, he is prayed to, with some other saints, in several Roman litanies said for persons who lie at the point of death.

Abel-Keramin, or *Vinearum*, beyond Jordan, in the country of the Ammonites, where Jephthah defeated them, seven miles distant from Philadelphia, abounding in vines, and hence the name. It was also called *Abela*.

Abel-Meholah, the country of the prophet Elisha, situated on this side Jordan, between the valley of Jezreel and the village Bethmael, in the plains of Jordan, where the Midianites were defeated by Gideon. Judges, vii. 22.

Abel-Mizraim, (called also the Threshing-floor of Atad) signifying the lamentation of the Egyptians; in allusion to the mourning for Jacob, Gen. l. 3, 10, 11. Supposed to be near Hebron.

Abel-Sattim, or *Sittim*, a town in the plains of Moab, to the north-east of the Dead Sea, not far from Jordan, where the Israelites committed fornication with the daughters of Moab: So called, probably, from the great number of sittim trees there.

ABELARD, Peter, an eminent scholastic philosopher of France, of noble descent, was born at Palais near Nantes in Bretagne, in the year 1079. Devoted to letters by his father's appointment, and by his own inclination, his literary attainments could at this time only be exhibited in the field of scholastic philosophy; and, that he might be fitted for his destined career of life, he was placed, after a previous course of grammatical studies, under the tuition of Rosceline, a celebrated metaphysician, and founder of the sect of the Nominalists. Under the instructions of this able master, at the early age of sixteen, he furnished himself with a large store of scholastic knowledge, and acquired a subtilty and quickness of thought, a fluency of speech, and facility of expression, which were necessary qualifications in scholastic disputation.

Having spent some time in visiting the schools of several provinces, in the twentieth year of his age he fixed his residence in the university of Paris, then the first seat of learning in Europe. The master, William de Champeaux, was at that time in high repute for his knowledge of philosophy, and his skill in the dialectic art; to him he committed the direction of his studies, and was at first contented with receiving instruction from so eminent a preceptor. De Champeaux was proud of the talents of his pupil, and admitted him to his friendship. But the aspiring youth ventured to contradict the opinions of his master, and in the public school held disputations with him, in which he was frequently victorious. The jealousy of the master and the vanity of the pupil naturally occasioned a speedy separation.

Elated by success, and confident of his own powers, Abelard, without hesitation, at the age of twenty-two, opened a public school of his own. Melun, a town ten leagues from Paris, where the court frequently resided, was the place which he chose for this bold display of his talents. But it was not without considerable difficulty that Abelard executed his plan; for De Champeaux, who regarded him as a rival, openly employed all his interest against him. Abelard at length prevailed, his school was opened, and his lectures were attended by crowded and admiring auditories. Emboldened by this success, and perhaps stimulated by unworthy resentment, Abelard resolved to maintain an open contest with his master, and for this purpose removed his school to Corbeil near Paris. The disputants frequently met in each other's schools; and the contest was supported on each side with great spirit, amidst crowds of their respective scholars. The young champion was in the end victorious, and his antagonist was obliged to retire.

Constant application and violent exertions had now so far impaired Abelard's health, that it was become necessary for him to interrupt his labours; and, with the advice of his physician, he withdrew to his native country. Two years afterwards, he returned to Corbeil, and found that De Champeaux had taken the monastic habit among the regular canons in the convent of St Victor; but that he still continued to teach rhetoric and logic, and to hold public disputations in theology. Returning to the charge, he renewed the contest, and his opponent was obliged to acknowledge himself defeated. The scholars of De Champeaux deserted him, and went over in crowds to Abelard. Even the new professor, who had taken the former school of De Champeaux, voluntarily surrendered the chair to the young philosopher, and requested to be enrolled among his disciples. A triumph so complete, while it gratified the vanity of Abelard, could not fail to provoke the resentment of his old master, who had influence to obtain the appointment of a new professor, and drive Abelard back to Melun. De Champeaux's motive for this violent proceeding was soon perceived; even his friends were ashamed of his conduct; and he retired from the convent into the country. When Abelard was informed of the flight of his adversary, he returned towards Paris, and took a new station at the abbey on Mount St Genevieve. His rival, the new professor, was unequal to the contest, and was soon deserted by his pupils, who flocked to the lectures of Abelard. De Champeaux, too, returning to his monastery, renewed the struggle; but so unsuccessfully, that Abelard was again victorious.

During a short absence, in which Abelard visited his native place, De Champeaux was preferred to the see of Chalons. The long and singular contest between these philosophers terminated; and Abelard, perhaps for want of a rival to stimulate his exertions, or possibly through envy of the good fortune of his rival, determined to exchange the study and profession of philosophy for that of theology. He therefore quitted his school at St Genevieve, and removed to Laon, to become a scholar of Anselm. From this celebrated master he entertained high expectations; but they were soon disappointed. On attending his lectures, he found that, though he possessed uncommon fluency of language, he left his auditors without instruction. Abelard gradually retired from these unprofitable lectures, but without offering offence either to the veteran professor or his scholars. In conversation one of them asked him, what he thought of the study of the Scriptures? Abelard replied, that he thought the explanation of them a task of no great difficulty; and to prove his assertion, he undertook to give a comment, the next day, upon any part of the Scriptures they should mention. They fixed upon the beginning of the prophecy of Ezekiel; and the next morning he explained the passage in a theological lecture, which was heard with admiration. For several successive days, the lectures were, at the request of the audience, continued; the whole town pressed to hear them; and the name of Abelard was echoed through the streets of Laon. Anselm, jealous of the rising fame of this young theologian, prohibited his lectures, under the pretence that so young a lecturer might fall into mistakes, which would bring discredit upon his master. Abelard, whose ambition required a wider field than that of Laon, obeyed the prohibition, and withdrew. He returned to Paris, whither the fame of his theological talents had arrived before him, and opened his school with his lectures on the prophecy of Ezekiel. His auditors were delighted; his school was crowded with scholars; and he united in his lectures the sciences of theology and philosophy with so much success, that multitudes repaired to him from various parts of France, from Spain, Italy, Germany, Flanders, and Great Britain.

Hitherto Abelard has appeared with high distinction, as an able disputant, and a popular preceptor: we must now view him under a different character, and when nearly arrived at the sober age of forty, see him, on a sudden, exchanging the school of philosophy for the bower of pleasure, and even disgracing himself, as will too plainly appear in the sequel, by forming and executing a deliberate plan for the seduction of female innocence. It happened that there was at this time, resident in Paris, Heloise, the niece of Fulbert, one of the canons of the cathedral church, a lady about eighteen years of age, of great personal beauty, and highly celebrated for her literary attainments. Abelard, whose vanity had been satiated with fame, and the vigour of whose mind was now enervated by repose, found himself inclined to listen to the voice of passion. He beheld with ardent admiration the lovely Heloise, and confident that his personal attractions were still irresistible, he determined to captivate her affections. Fulbert, who doubtless thought himself honoured by the visits of so eminent a scholar and philosopher, received him into his house as a learned friend. He was soon afterwards prevailed upon, by a handsome payment which Abelard offered for his board, to admit him into his family; and, apprehending no hazard from a man of Abelard's age and profession, requested him to undertake the instruction of Heloise. Abelard accepted the trust, but, as it seems, without any other intention than to betray it. The hours of instruction were employed in other lessons than those of learning and philosophy; but Fulbert's respectful opinion of the philosopher, and his partiality for his niece, long concealed from him an amour, which was become the subject of general conversation. Upon discovering her pregnancy, it was thought necessary for her to quit her uncle's house; and Abelard conveyed her to Bretagne, where his sister was prepared to receive them. Here Heloise was delivered of a son, to whom they gave the whimsical name of Astrolabus. Abelard, upon the birth of the child, proposed to Fulbert to marry his niece, provided the marriage might be kept secret: Fulbert consented, and Abelard returned to Bretagne to fulfil his engagement. Heloise, partly out of regard to the honour of Abelard, whose profession bound him to celibacy, and partly from a romantic notion that love like hers ought not to submit to ordinary restraints, at first gave Abelard a peremptory refusal. He, however, at last prevailed, and they were privately married at Paris. Heloise from this time met with severe treatment from her uncle, which furnished Abelard with a plea for removing her from his house, and placing her in the abbey of Benedictine nuns, in which she had been educated. Fulbert concluded, perhaps not without reason, that Abelard had taken this step, in order to rid himself of an encumbrance which obstructed his future prospects. Deep resentment took possession of his soul, and he meditated revenge. He employed several ruffians to enter his chamber by night, and inflict upon his person a disgraceful and cruel mutilation. The deed was perpetrated; the ruffians were taken, and suffered, according to the *Lex Talionis*, the punishment they had inflicted; and Fulbert, for his savage revenge, was deprived of his benefice, and his goods were confiscated. Unable to support his mortifying reflections, Abelard resolved to retire to a convent. At the same time he formed the selfish resolution, that, since Heloise could no longer be his, she should never be another's, and ungenerously demanded from her a promise to devote herself to religion; and even insisted upon her taking the holy vow before him, suspecting, as it seems, that if he first engaged himself, she might violate her promise, and return to the world.

A few days after Heloise had taken her vows, Abelard assumed the monastic habit in the abbey of St Denys, determined, as it seems, to forget, in hope of being forgotten by the world. However, his admirers and scholars in Paris were unwilling that the world should lose the benefit of his labours, and sent deputies to entreat him to return to his school. After some deliberation, he again yielded to the call of ambition; and at a small village in the country, he resumed his lectures, and soon found himself surrounded with a numerous train of scholars. The revival of his popularity renewed the jealousy of other professors, who took the first opportunity of bringing him under ecclesiastical censure. A treatise which he published at this time, entitled, *The Theology of Abelard*, was supposed to contain some heretical tenets. A synod was called at Soissons in the year 1121; the work was condemned to be burnt, and Abelard was commanded to throw it into the flames. After being involved in other controversies, new charges were brought against him, and he fled to the convent of St Ayoul at Provins in Champagne, the prior of which was his intimate friend. The place of his retreat was soon discovered, and threats and persuasions were in vain employed to recall him: at last he obtained permission to retire to some solitary retreat, on condition that he should never again become a member of a convent.

The spot which he chose was a vale in the forest of Champagne, near Nogent upon the Seine. Here Abelard, in 1122, erected a small oratory, which he dedicated to the Trinity, and which he afterwards enlarged, and consecrated to the Third Person, the Comforter, or Paraclete. Here he was soon discovered, and followed by a train of scholars. A rustic college arose in the forest, and the number of his pupils soon increased to six hundred. Jealousy again provoked the exertions of his enemies, and he was meditating his escape, when, through the interest of the duke of Bretagne, and with the consent of the abbot of St Denys, he was elected superior of the monastery of St Gildas, in the diocese of Vannes, where, though not without frequent and grievous vexations, he remained several years.

About this time, Suger, the abbot of St Denys, on the plea of an ancient right, obtained a grant for annexing the convent of Argenteuil, of which Heloise was now prioress, to St Denys; and the nuns, who were accused of irregular practices, were dispersed. Abelard, informed of the distressed situation of Heloise, invited her, with her companions, eight in number, to take possession of the Paraclete.

It was during Abelard's residence at St Gildas that the interesting correspondence passed between him and Heloise, which is still extant. The letters of Heloise, in this correspondence, abound with proofs of genius, learning, and taste, which might have graced a better age. It is upon these letters that Mr Pope has formed his celebrated Epistle from Eloisa to Abelard. Here, too, Abelard probably wrote his *Theology*, which again subjected him to persecution. His opinions were pronounced heretical by a council; and although he appealed to Rome, the judgment of the council was confirmed by the pope; and he was sentenced, unheard, to perpetual silence and imprisonment. By the interposition of some friends, however, and by a submissive apology, he obtained his pardon, with permission to end his days in the monastery of Cluni.

At Cluni he was retired, studious, and devout. The monks of the convent importuned him to resume the business of instruction. In a few occasional efforts he complied with their solicitations; and his lectures were heard with undiminished applause. But his health and spirits were much enfeebled, and gradually declined till he died in the 63d year of his age, A. D. 1142. His body was sent to Heloise to be interred in the convent of the Paraclete. Heloise survived her husband 21 years, a pattern of conjugal affection and monastic virtue; and was buried in the same grave. The writings of Abelard will not give the reader a high idea of his genius or taste; but it cannot be questioned, that the man who could foil the first masters of the age at the weapons of logic, draw round him crowded and admiring auditors, and collect scholars from different provinces and countries wherever he chose to form a school, must have possessed extraordinary talents. Had his love of truth been equal to his thirst of fame, and had his courage in adhering to his principles been equal to his ingenuity in defending them, his sufferings and persecutions might have excited more regret, and his title to honourable remembrance would have been better established.

His principal works, written in Latin, are, An Address to the Paraclete on the Study of the Scriptures; Problems and Solutions; Sermons on the Festivals; A Treatise against Heresies; An Exposition of the Lord's Prayer; A Commentary on the Romans; A System of Theology; and his Letters to Heloise and to others. Of some of those letters, and the answers, there are translations in Bonnington's *History of the Lives of Abelard and Heloise.* The best Latin edition is that of Rawlinson, London, 1716, 8vo.

ABELIANS, Abelites, or Abelonians, in church history, a sect of heretics mentioned by St Austin, which arose in the diocese of Hippo in Africa, and is supposed to have begun in the reign of Arcadius, and ended in that of Theodosius. Indeed it was not calculated for being of any long continuance. Those of this sect regulated marriage after the example of Abel; who, they pretended, was married, but died without ever having known his wife. They therefore allowed each man to marry one woman, but enjoined them to live in continence; and, to keep up the sect, when a man and woman entered into this society, they adopted a boy and a girl, who were to inherit their goods, and to marry upon the same terms of not begetting children, but of adopting two of different sexes.

ABELLA, now Avella, anciently a town of Campania, near the river Clanius. The inhabitants were called Abellani, and said to have been a colony of Chalcidians. The nux Avellana, called also *Prænestina*, or the *hazel nut*, takes its name from this town, according to Macrobius.

ABELLINUM, now Avellino, anciently a town of the Hirpini, between Beneventum and Salernum. Long. 14. 50. E. Lat. 41. 0. N.

ABEN-EZRA, Abraham, a celebrated rabbi, born at Toledo in Spain, called by the Jews the wise, great, and admirable Doctor, was a very able interpreter of the Holy Scriptures; and was well skilled in grammar, poetry, philosophy, astronomy, and medicine. He was also a perfect master of the Arabic. His principal work is, Commentaries on the Old Testament, which is much esteemed: these are printed in Bomberg's and Buxtorf's Hebrew Bibles. His style is clear, elegant, concise, and much like that of the Holy Scriptures: he almost always adheres to the literal sense, and everywhere gives proofs of his genius and good sense; he, however, advances some erroneous sentiments. The scarcest of all his books is entitled *Jesud Mora*, which is a theological work, intended as an exhortation to the study of the Talmud. He also wrote *Elegantiæ Grammaticæ*, printed in octavo at Venice in 1548. He died in 1174, aged 75.

Aben Meller, a learned rabbi, who wrote a commentary on the Old Testament in Hebrew, entitled, *The Perfection of Beauty.* This rabbi generally follows the grammatical sense and the opinions of Kimchi. The best edition is that of Holland.

ABENAS, a town of France, in the department of Ardeche; and upon a river of the same name, at the foot of the Cevennes. Long. 4. 20. E. Lat. 44. 37. N.

ABENHEIM, a market town in the bailiwick of Alzey, and province of the Rhine, in the grand duchy of Hesse Darmstadt, with 940 inhabitants, who make some excellent wine.

ABENSBERG, a bailiwick in the circle of Regen, in the kingdom of Bavaria. Its extent is 160 square miles, or 102,400 acres. It is watered by the Danube on its north-west boundary. The land is even, the soil partly good, and some excellent. Both corn, green crops, and grazing, are pursued with success. The numbers of swine are very great, which are bred and sold to other districts to be fattened. The inhabitants, in 2 cities, 3 towns, and 301 villages, amounted in 1833 to 14,200.

Abensberg, a small city, capital of the bailiwick of the same name, in Bavaria, containing, in 1833, 254 houses and 1194 inhabitants. It was formerly the seat of the Counts Abenberg. A great battle was fought near this place between the French and Austrians in the year 1809, in which the latter were defeated.

ABENSPERG, a small town of Germany, in the kingdom of Bavaria, and in the government of Munich. It is seated on the river Abentz, near the Danube. Long. 11. 38. E. Lat. 48. 45. N.

ABERAVON, a borough town of Glamorganshire, in Wales, seated at the mouth of the river Avon, 194 miles west of London. Long. 3. 35. W. Lat. 51. 40. N. Population in 1811, 321; in 1821, 365; and in 1831, 573.

ABERBROTHICK, or Arbroath, a seaport town of Scotland, in the county of Angus, situated at the discharge of the little river Brothic into the sea, as the name imports, *Aber* in the British implying such a situation. It is a flourishing place, well built, and still increasing. Having been in an improving state for the last forty years, it has now a considerable trade, and employs about 6400 tons of shipping, chiefly in the importation of flax, the raw material of its manufactures; of flax-seed, timber, iron, &c. from the Baltic. The chief employment of the inhabitants is the spinning of flax by machinery, and its subsequent manufacture into sheetings. A considerable coasting trade is carried on to London and to the ports on the east coast of England, as well as to Leith and the other ports in the frith of Forth. At this place, in default of a natural harbour, an artificial one of piers has been formed, where, at spring tides, which rise here fifteen feet, ships of two hundred tons can come, and of eighty at neap tides; but they must lie dry at low water. Its chief fault is that it is small, and offers no refuge from the German Ocean in easterly storms. This port is of great antiquity: there is an agreement yet extant between the abbot and the burghers of Aberbrothick, in 1194, concerning the making of the harbour. Both parties were bound to contribute their proportions; but the largest fell to the share of the former, for which he was to receive an annual tax payable out of every rood of land lying within the borough. The glory of this place was the abbey, whose very ruins give some idea of its former magnificence. It was founded by William the Lion in 1178, and dedicated to our celebrated primate Thomas a Becket. The founder was buried there; but there are no remains of his tomb, or any other, excepting that of a monk of the name of Alexander Nicol. The monks were of the Tyronensian order; and were first brought from Kelso, whose abbot declared those of this place, on the first institution, to be free from his jurisdiction. The last abbot was the famous Cardinal Beaton, at the same time archbishop of St Andrews, and, before his death, as great and absolute here as Wolsey was in England. King John, the English monarch, granted this monastery most uncommon privileges; for, by charter under the great seal, he exempted it *a teloniis et consuetudine* in every part of England, except London. At Aberbrothick is a chalybeate water, similar to those of Peterhead and Glendye. The only public buildings worthy of notice, besides the ruins of the abbey, are the parish church and chapels of ease, the town-house, the public schools, and the signal tower which communicates with the Bell Rock light-house at 12 miles distance in the German Ocean. Arbroath is a royal burgh, and unites with Forfar, Inverbervie, Montrose, and Brechin, in sending a member to the British parliament. The municipal government of the burgh rests with a provost, two bailies, dean of guild, and treasurer, and other twelve members of council. The income of the burgh is about L.3000 a year. Aberbrothick is 58 miles N.N.E. of Edinburgh. The population amounted in 1801 to 7075, in 1821 to 8906, and in 1831 to 11,211. Long. 2. 34. 15. W. Lat. 56. 32. 30. N.

ABERCONWAY, or CONWAY, in Caernarvonshire, North Wales; so called from its situation at the mouth of the river Conway. It is a handsome town, pleasantly situated on the side of a hill, and has many conveniences for trade; notwithstanding which it is the poorest town in the county. It was built by Edward I; and had not only walls, but a strong castle, which is now in ruins. It is 229 miles from London. Long. 3. 47. W. Lat. 53. 20. N. The population in 1811 was 1053; in 1821, 1105; and in 1831, 1245.

ABERCROMBY, THE HONOURABLE ALEXANDER (Lord Abercromby), a Judge in the Courts of Session and Justiciary in Scotland, was the youngest son of George Abercromby, of Tullibody, Esq. of a respectable family in Clackmannanshire, and was born on the 15th October 1745. Mr Abercromby was early destined for the profession of the law, and with this view he was educated at the university of Edinburgh, where he passed through the requisite course of languages, philosophy, and law, and was admitted advocate in the year 1766. In 1780 he resigned the office of sheriff-depute of Stirlingshire, which he had held for several years, and accepted of that of depute-advocate, with the hope of extending his employment in the line of his profession. In this step he was not disappointed; for his reputation and business rapidly increased, and soon raised him to the first rank at the Scotch bar. But he still retained a taste for the elegant amusements of polite literature, and was one of that society who set on foot two periodical papers, the *Mirror* and *Lounger*, published at Edinburgh; the former in 1779, and the latter in 1785. To the *Mirror* he contributed ten papers, and to the *Lounger* nine. The names of the authors have been published in the late editions of these works, which renders it unnecessary to point out those papers of which Mr Abercromby was the author. In May 1792, he was appointed one of the Judges of the Court of Session, and in December following he was called to a seat in the Court of Justiciary. Lord Abercromby continued to discharge the arduous duties of these important offices till summer 1795, when he was seized with a pectoral complaint, of which he died on the 17th November the same year, at Exmouth in Devonshire, where he had gone for the recovery of his health.

ABERCROMBY, *Sir Ralph*, knight of the Bath, and a lieutenant-general in the British army, an elder brother of the preceding, was born in the year 1738. Being destined for the army, he obtained, in May 1756, a cornet's commission in the 2d dragoon guards; and rose, April 24. 1762, to the rank of a captain in the 3d regiment of horse. Ascending through the intermediate gradations of rank, he was appointed, November 3. 1781, to the colonelcy of the 103d infantry. September 28. 1787, he was promoted to the rank of major-general. November 5. 1795, he obtained the command of the 7th regiment of dragoons. Having been nearly 40 years in the army, having served with honour in two wars, and being esteemed one of the ablest, coolest, and most intrepid officers in the whole British forces, he was employed on the continent under his Royal Highness the Duke of York, in the commencement of the war against the French republic. In the action on the heights of Cateau, he commanded the advanced guard, and was wounded at Nimeguen. He conducted the march of the guards from Deventer to Oldensal, in the retreat of the British out of Holland, in the winter of 1794–5. In August 1795, he was appointed to succeed Sir Charles Grey, as commander-in-chief of the British forces in the West Indies. March 24. 1796, Grenada was suddenly attacked and taken by a detachment of the army under his orders. He afterwards obtained possession of the settlements of Demerara and Essequibo, in South America. St Lucia was next taken by more difficult exertions, in which his ability was signally displayed. St Vincent was, by the middle of June, added to the British conquests. Trinidad, in February 1797, shared the same fate. He returned the same year to Europe, and, in reward for such important services, was invested with the red ribbon, appointed to the command of the regiment of Scots Greys, intrusted with the governments of the Isle of Wight, Fort George, and Fort Augustus, and raised to the rank of lieutenant-general. He held, for a time, the chief command of the forces in Ireland. In that command, he laboured to maintain the discipline of the army, to suppress the rising rebellion, and to protect the people from military oppression, with a care worthy alike of the great general and the enlightened and beneficent statesman. From that station he was called to the chief command of the forces in Scotland. When the enterprise against Holland was resolved upon, Sir Ralph Abercromby was called again to command, under his

Royal Highness the Duke of York. The difficulties of the ground, the inclemency of the season, delays, though inconvenient, yet unavoidable, the disorderly movements of the Russians, and the timid duplicity of the Dutch, disappointed our hopes of that expedition. But by the Dutch, the French, the British, it was confessed, that even victory the most decisive could not have more conspicuously proved the talents of this distinguished officer. His country applauded the choice, when, in 1801, he was sent with an army to dispossess the French of Egypt. His experience in Holland and Flanders, and in the climate of the West Indies, particularly fitted him for this new command. He accomplished some of the first duties of a general, in carrying his army in health, in spirits, and with the requisite intelligence and supplies, to the destined scene of action. The landing, the first dispositions, the attack, and the superiority over the French which the British infantry under his command evinced, all bear testimony to the high military talents of this commander. It was his fate to fall in the moment of victory. General Lord Hutchinson, who succeeded him in the command, in the dispatches with the account of his death, has given a fine eulogium on his character as a soldier, and strongly expressive of the high estimation in which he was held by the army.—"We have sustained an irreparable loss in the person of our never sufficiently to be lamented commander-in-chief, Sir Ralph Abercromby, who was mortally wounded in the action, and died on the 28th of March. I believe he was wounded early, but he concealed his situation from those about him, and continued in the field, giving his orders with that coolness and perspicuity which had ever marked his character, till long after the action was over, when he fainted through weakness and loss of blood. Were it permitted for a soldier to regret any one who has fallen in the service of his country, I might be excused for lamenting him more than any other person; but it is some consolation to those who tenderly loved him, that, as his life was honourable, so was his death glorious. His memory will be recorded in the annals of his country—will be sacred to every British soldier—and embalmed in the recollection of a grateful posterity." His remains were conveyed on board Admiral Lord Keith's flag-ship to Malta, attended by Colonel Sir John Dyer, and were interred in the commandery of the grand master, with the highest military honours. A monument to his memory was erected in St Paul's church, London, in pursuance of a vote of the House of Commons. His widow was created a peeress, and a pension of L.2000 a-year for her and three lives settled on the family. (*Gent. Mag.*)

ABERDEEN, *Old*, is a place of great antiquity. According to tradition, it was of note in the reign of Gregory, who conferred on it some privileges about the year 893. In 1004, Malcolm II. founded a bishopric at a place called Mortlich in Banffshire, in memory of a signal victory which he there gained over the Danes: which bishopric was translated to Old Aberdeen by David I.; and in 1153, the then bishop of Aberdeen obtained a new charter from Malcolm IV. There is extant a charter of Alexander II. by which, in 1217, the king grants to Aberdeen the same privileges he had granted to his town of Perth. The town lies about a mile to the north of the New Town, at the mouth of the river Don, over which is a fine Gothic bridge, of a single arch, greatly admired, which rests on a rock on each side. This arch, said to have been built by a bishop of Aberdeen about the year 1290, is 67 feet wide at the bottom, and 34½ feet high above the surface of the river, which at ebb tide is here 19 feet deep. This town, which consists chiefly of one long street, was formerly the seat of the bishop, and had a large cathedral commonly called St Machar's. Two very antique and lofty spires of stone, and the nave, which is used as a church, are now the only remains of it. They are finely ornamented, and are in a state of complete repair. The bishopric was founded in the time of David I. as above mentioned. The cathedral had anciently two rows of stone pillars across the church, and three turrets; the steeple, which was the largest of these turrets, rested upon an arch, supported by four pillars. In this cathedral there was a fine library; but about the year 1560, it was almost totally destroyed. But the capital building is the King's College, on the south side of the town, which is a large and stately fabric. It is built in form of a square, with cloisters on the south side. The chapel is very ruinous within; but there still remains some wood work of exquisite workmanship. This was preserved by the spirit of the principal at the time of the Reformation, who armed his people, and checked the blind zeal of the barons of the Mearns; who, after stripping the cathedral of its roof, and robbing it of the bells, were about to violate this seat of learning. The steeple is vaulted with a double cross arch; above which is an imperial crown, supported by eight stone pillars, and closed with a globe and two gilded crosses. In the year 1631, this steeple was thrown down by a storm, but was soon after rebuilt in a more stately form. This college was founded in 1494, by William Elphinston, bishop of this place, lord chancellor of Scotland in the reign of James III. and lord privy seal in that of James IV. But James IV. claimed the patronage of it, and it has since been called the *King's College*. The library is considerable, and now contains upwards of 25,000 volumes. Hector Boethius was the first principal of the college, and was sent for from Paris for that purpose, on an annual salary of forty merks Scots, at thirteen pence each. The square tower on the side of the college was built by contributions from General Monk and the officers under him then quartered at Aberdeen, for the reception of students. The professorships are Divinity, Medicine, Civil Law, Moral Philosophy, Mathematics, Natural Philosophy, Greek, Humanity, and Oriental Languages; and there are numerous bursaries for the poorer students. Population, by the last return, nearly 1500.

ABERDEEN, *New*, a considerable seaport, and capital of the county of Aberdeen. It is situated on the German Ocean, at the mouth of the river Dee, and in point of population, wealth, and commerce, ranks as the chief town in the north of Scotland. In 1800, an act was obtained for the general improvement of the city; and since this period its whole appearance and plan have been changed. New and spacious streets have been opened, bridges of communication have been built, and other improvements executed, ornamental as well as useful. Union Street, which affords a splendid access from the south and west, extends from the market-place 1350 yards, and is 70 feet wide. The houses are built of dressed granite; and when the street is completely filled up, it will present a fine appearance. To facilitate the access into the town by means of this street, an elegant bridge, of a single arch, the span of which is 132 feet, has been erected at an expense of L.10,000. A new opening to the north has been made by King's Street; and on the line of this street there is also a bridge over the river Don, of five arches, each of 75 feet, which has been constructed at an expense of L.14,000. Since 1800, numerous other new streets have been opened, and many of them nearly completed. In consequence of these improvements, Aberdeen may be considered as a spacious, elegant, and well-built city. The public buildings are numerous. There are about 30 places for divine worship. Connected with the established religion are the East and West churches, forming a continuous building 170 feet in length, and adorned with a spire 150 feet in height; besides eleven other parish churches. St Andrew's church is an elegant new building, constructed of freestone. There are three episcopal chapels; six meeting-houses for seceders; five congregational and baptist churches; one methodist meeting-house; a Roman Catholic chapel; a meeting-house for the society of friends; and seven other places of worship for various denominations.

The charitable institutions are numerous. The infirmary, a large and commodious building, for the reception and cure of the diseased poor, has lately received considerable additions. The managers were incorporated by royal charter in 1773. It has extensive funds, derived from donations, bequests, and periodical contributions. The lunatic asylum was opened in 1800, and is under the same management as the infirmary. A large and elegant building has been added to the original house, and accommodation is now afforded to all classes of lunatics. There is also a poor-house for the relief of the indigent, and the education of destitute children and orphans. Gordon's hospital, for the maintenance of 130 boys, the sons of decayed burgesses, is a very handsome building. There are two schools, one for boys and the other for girls, on the Lancasterian plan; and there is another for the education of the deaf and dumb. In addition to these, there are various other schools supported by subscriptions, donations, and bequests; and the funds of the seven incorporated trades are amply sufficient for the support of decayed members, widows, and orphans.

The college called Marischal College was founded by George Keith, earl marshal, in the year 1593. It has a good library, an observatory, and an excellent apparatus of philosophical instruments. The languages, mathematics, moral and natural philosophy, natural history, and medicine, are taught here. The foundation of a splendid new building for this college was laid in 1837. The other public buildings are the town-house and old tolbooth, which stands on the north side of the market-place, and which is surmounted by a handsome spire 120 feet in height; and connected with it there has been erected a new court-house, which combines the advantages of elegance, convenience, and comfort. In the square, and fronting the town-house, stands the cross, which is adorned with busts, cut in stone, of the royal family of Scotland, from James I. to James VII. inclusively. The assembly-rooms, in Union Street, were built in 1821, by subscription. They are constructed of beautiful granite, handsomely ornamented. The rooms, which are ninety feet in front, and 156 feet at the back of the edifice, are splendidly finished in the interior. There are military barracks, which were erected in 1796; a bridewell, which was opened in 1809; and a neat theatre.

The commerce and manufactures of Aberdeen are extensive and flourishing. One of the most important branches of manufacture is the cotton, which was introduced about the year 1779, and has given rise to several large establishments, in the greater number of which steam-engines are employed. There are other smaller works, which manufacture stripes, winseys, druggets, &c. The whole give employment to about 4000 hands. There are four large woollen manufactories, three of which are moved by water, and the other, being the most extensive, by steam. In these are manufactured superfine broad and narrow cloths, blankets and serges, stockings, worsted yarns, &c. The manufacture of carpeting, chiefly for the London and American markets, has been introduced within these few years. The linen manufacture, particularly that of thread, is carried on in all its branches to a great extent. There are several breweries, in which porter and ales are made; and considerable quantities are annually exported to America and the West Indies. There are likewise several distilleries, the number of which has been increased since the reduction of the duty on spirits. Some extensive iron-works have also been established, in which are manufactured ships' anchors, chain-cables, steam-engines, spinning machinery, locks, hinges, &c. There are also manufactures of soap, candles, leather, &c. The granite stones, so famous for their durability, which are quarried, dressed, and shipped from this port, form a staple commodity for exportation, and are a great source of wealth to the place, by giving employment to many thousands of industrious labourers. These stones are chiefly used for paving streets; for building bridges, wharfs, and docks; and for erecting lighthouses, and other works. There are six banking establishments in the town.

The aggregate tonnage of the vessels belonging to the port of Aberdeen is at present (1838) above 30,000. They trade to North and South America, the West Indies, the Mediterranean, the Baltic, Greenland, Davis' Straits, and most of the ports of the united kingdom. Ship-building is carried on to a great extent, and gives employment to numerous hands. The want of a proper harbour was long a detriment to the trade of Aberdeen, and occasioned the loss of many lives, and of much property. To remedy this defect a pier was built in 1776, by Smeaton, on the north side of the old harbour, extending a considerable way into the German Ocean; and by an act obtained in 1810, it was still farther enlarged. This extensive quay is built of large masses of dressed granite, and measures in length 2300 yards. In consequence of this improvement the depth of water on the bar is at spring-tides upwards of nineteen feet, and at neap-tides fourteen feet, where they had formerly only a few feet. In 1829, the present harbour act was passed. It has since that time undergone important improvements, by the construction of wet and dry docks, and the extension of the quay at its south side. The flood-gates, and other works necessary for the completion of Telford's plan of 1810, are expected to commence in the summer of this year (1838). A lighthouse is erected at the head of the north pier, having a fixed light with red colour, and is seen at the distance of four miles.

Aberdeen is a place of antiquity, its records being preserved from the time of William the Lion, A. D. 1214. In the thirteenth century Aberdeen was a commercial place, and soon grew to be of some note. From the beginning of the fifteenth century the journals of the magistrates and town-council come down in a regular series. The town is governed by a magistracy, consisting of a provost, four bailies, a dean of guild, and a treasurer. The other members of the council amount to twelve, all being chosen by the electors within the parliamentary bounds. In 1333 and 1336 the town was burnt by a fleet of Edward III.; but it was speedily afterwards rebuilt, and was afterwards known by the name of New Aberdeen. The property of the city was valued in 1832 at L.223,979. 19s. 4d., and the debts and obligations at L.199,596. 13s. 4d. The ordinary revenue is about L.11,000, and the expenditure about L.9000. The income arising from the harbour in 1837 was L.15,773. 5s. 3d., and the ordinary expenditure L.8714. 2s. The sum expended on the harbour improvements amounted to L.7245. 16s. 4d. It returns one member to parliament. The population amounted in 1811 to 35,370, in 1821 to 44,796, and in 1831 to 58,019. Aberdeen is distant 108 miles north of Edinburgh, and 118 from Inverness. Long. 2. 5. 42. W. Lat. 57. 8. 58. N. (F.)

Aberdeenshire.

ABERDEENSHIRE, a county in Scotland, situate in the north-east, between 56. 52. and 57. 42. north latitude, and between 1. 49. and 3. 48. of longitude west from Greenwich. It is bounded by the German Ocean on the north and east; by the counties of Kincardine, Forfar, and Perth, on the south; and by those of Inverness, Moray, and Banff, on the west. Its greatest length is 85, and breadth 40 miles; the bounding line being about 280 miles, of which 60 are on the sea-coast. By a careful measurement of Arrowsmith's map, it is found to contain 1960 square miles, an area equal to 1,254,400 English or 994,520 Scotch acres; of which somewhat more than one-third is under cultivation. It contains 88 parishes, and is usually described under five divisions. First, *Marr*, which is a mountainous district, particularly Braemar, the highland part of it; few of the bounding mountains being less than 3000 feet, and several of them more than 4000 feet above the level of the sea. Red deer are here found in great numbers, sometimes 300 in a flock; and moor game abounds in this as in all the more elevated parts of the county. Second, *Formartin*, of which the land on the sea-coast is low and fertile; but hills and mosses are spread over the interior. Third, *Buchan*, the most extensive division next to Marr, having a bold precipitous shore of 50 miles, but generally a flat surface, the soil of which has been greatly improved of late by the cultivation of turnips and clover. The Bullers of Buchan, about 6 miles south from Peterhead, is a natural curiosity, which has been often described by tourists. Fourth, *Garioch*, a large and beautiful valley, naturally very fertile. Before the introduction of modern husbandry, it was termed the granary of Aberdeen. And, fifth, *Strathbogie*, the greater part of which consists of hills, mosses, and moors. On a comprehensive review, it may be said, that, with the exception of the low grounds of Buchan, and the highlands of the south-west division, Aberdeenshire consists for the most part of tracks nearly level, but often bleak, naked, and unfertile, though interspersed with many rich spots in a high state of cultivation. In extent, it is very nearly one-sixteenth part of Scotland.

Aberdeenshire is not rich in mineral productions. No coal has been found in it, and limestone, though it exists in many parts, is by no means abundant. Slate quarries are wrought to a small extent on the hill of Foudland, in the Garioch division; manganese is found near Aberdeen; and black lead has been discovered in the neighbourhood of Huntly. The mountains of Braemar contain those precious stones called *Cairngorums* by the country people, who go thither in whole families to search for them during the summer season; they are sold, sometimes at high prices, chiefly to the London jewellers. But granite is the most abundant mineral, and has brought considerable sums into the county, besides supplying the inhabitants with excellent stones, for building and other purposes. As many stones have been raised from an acre of land under preparation for tillage, as brought from L.30 to L.50, for paving the streets of London. The exportation of granite to the capital employed at one time about 70 vessels of 7000 tons, and 400 men; and the value of all the stones exported yearly was stated at L.40,000.

The principal rivers are the Dee and the Don. The gross annual produce of the salmon-fisheries on these two rivers was estimated a few years ago at nearly L.35,000. The Ythan and Ugie within the county, and the Deveron and Bogie on its boundaries, are also considerable streams. Muscles are plentiful near the mouth of the Ythan; and pearl muscles have been sometimes discovered at its lower extremity. One of the jewels of the ancient crown of Scotland, a valuable pearl, is said to have been found here.

Aberdeenshire.

There are also several lakes well stored with pike, trout, eels, and other kinds of fish. The county is noted for its chalybeate springs at Peterhead, Fraserburgh, and at Pananich on the Dee.

The climate of Aberdeenshire, except in the mountainous districts, is rendered comparatively mild by its being bounded on two sides by the sea. The winters are not so severe as in some of the southern counties, but the springs are late, owing to the prevalence of easterly winds; and in autumn the weather is often wet and stormy. Wheat, however, and all the other crops cultivated in Scotland, come to perfection; and the inhabitants, who are not subject to any local diseases, sometimes live to a great age.

The district of Marr, containing almost half the county, abounds in natural woods, which are a source of wealth to their proprietors, and of profitable employment to the inhabitants. This country is so well adapted to the growth of trees, that it is only necessary to shut out the cattle by inclosures, and the birds and winds supply it with seeds that soon rise into vigorous plants. These woods consist chiefly of Scotch fir; and the timber, especially what grows in the forests of Braemar, has been thought superior to any that Scotland has imported from the north of Europe. About a tenth part of the whole surface of the county is under wood; and the trees found in the peat mosses indicate the existence of still more extensive forests in former ages.

Ruins of ancient edifices are seen in different parts of the county. In the Garioch district, the vitrified fort called Dun-o-Deer, built on the summit of a beautiful conical hill, which springs about 300 feet from its base, is supposed to be 1000 years old; and is said to have been the residence of King Gregory the Great (as he is called by the old Scotish historians), who died in 892. The ruins of two buildings, supposed to have belonged to Malcolm Kenmore, who died in 1004, are still pointed out. One of them, situate at Castletown of Braemar, was his hunting seat; the other stands in a small island in Loch Kanders, and must have been inaccessible, except when the lake was frozen. A wooden bridge, which connected it with the land, has been found in the lake. The castle of Kildrummy, which in 1150 was the property of David Earl of Huntingdon, must have been a princely edifice, covering nearly an acre of ground; and its venerable remains still show the power and grandeur of the chieftains by whom it was inhabited. In the same district are some ancient subterraneous retreats, supposed to have been used by the Picts as places of refuge from an invading enemy.

The agriculture of Aberdeenshire has been considerably improved of late years; potatoes, turnips, and clover, as well as wheat and other crops, are now cultivated according to the best courses of modern husbandry. Farms, however, are still generally of a small size, compared with those of the south-eastern counties; and the buildings, though gradually improving, are for the most part much less convenient and comfortable. Here, as in every other part of Scotland, a lease for nineteen years is the most common bond of connection between the landholder and farmer; but it would appear that the covenants of leases are still in a considerable degree dictated by feudal ideas.

In most parts of Aberdeenshire, cattle are a more important object to the tenantry than corn; the number is stated at 110,000; and the sales, to England and to the south of Scotland, amounting to about 12,000, were estimated some years ago to bring L.150,000 annually. About two-thirds of the population depend entirely on agriculture; oatmeal, prepared in different ways, with potatoes, is the principal food of the labouring classes.

Besides the salmon-fisheries already noticed, the sea-fishing employs a number of hands. The Greenland whale-fishery is carried on with great success, by ships fitted out from Aberdeen and Peterhead. The whole fisheries connected with the county are said to yield from L.80,000 to L.100,000 annually.

The old staple manufacture, the knitting of stockings, has declined considerably for several years; but those in wool, cotton, and flax, are upon an extensive scale, and employ a large proportion of the inhabitants. There are also establishments for making sail-cloth, inkle, paper, &c.; and, from the characteristic ingenuity and enterprise of the people, Aberdeenshire may soon assume a still higher rank among the manufacturing counties of Britain.

A share of our foreign trade, chiefly with the north of Europe, has been long enjoyed by this county; and the recent improvements on the harbour of Aberdeen must contribute essentially to the extension of its commerce. In 1807 a canal was opened from the harbour of Aberdeen to the town of Inverury, a distance of 18¼ miles, the expense of which was about L.44,000. The facilities which this canal affords for the conveyance of coal, lime, and the excellent stone so abundant in the tract of country through which it is cut, have already proved highly beneficial to the agriculture of the county, as also to the prosperity of Aberdeen.

The *valued rent* of the county is L.235,665. 8s. 11d. Scots; but the *real rent* for the lands and houses is probably not less than L.325,000 sterling.

The principal seats in Aberdeenshire are, Aboyne Castle, the Earl of Aboyne; Ellon Castle and Haddo House, the Earl of Aberdeen; Huntly Lodge, the Duke of Gordon; Keith Hall, the Earl of Kintore; Marr Lodge, the Earl of Fife; Philorth House, Lord Saltoun; Pitfour, Ferguson; Castle Forbes, Lord Forbes; Skene House, Skene; Slaines Castle, the Earl of Errol. The prevailing names among the proprietors are, Gordon, Forbes, Grant, Fraser, Duff, and Ferguson. The county sends one member to parliament, and its three royal boroughs, Aberdeen, Kintore, and Inverury, have a share in the election of other two; Aberdeen returning one, and Kintore and Inverury, with Banff, Cullen, Elgin, and Peterhead, another member.

In the returns made under the population acts, the county is divided into eight districts, viz. Aberdeen, Alford, Deer or Buchan, Ellon, Garioch, Kincardine O'Neil, Strathbogie, and Turreff. The following table shows the number of inhabitants at each of the three censuses made under these acts. In this, as in the other maritime counties of the north, there is a considerable disproportion between the number of the sexes.

DISTRICTS.	1811.			1821.			1831.		
	MALES.	FEMALES.	TOTAL.	MALES.	FEMALES.	TOTAL.	MALES.	FEMALES.	TOTAL.
Aberdeen,	18,641	25,570	44,211	24,613	30,481	55,094	31,047	38,731	69,778
Alford,	4,251	4,800	9,051	5,165	5,146	10,311	5,960	5,963	11,923
Deer,	11,360	14,615	25,975	13,249	15,629	28,878	13,910	16,565	30,475
Ellon,	5,325	6,112	11,437	6,086	6,378	12,464	6.280	6.551	12,831
Garioch,	5,939	6,527	12,466	6,825	7,181	14,006	7,765	8,022	15,787
Kincardine O'Neil,	6,231	7,113	13,344	6,963	7,560	14,523	7,448	7,967	15,415
Strathbogie,	4,007	4,821	8,828	4,401	5,024	9,425	4,552	5,166	9.718
Turreff,	4,405	5,358	9,763	5,081	5,605	10,686	5,626	6,104	11,730
	60,159	74,916	135,075	72,383	83,004	155,387	82,588	95,069	177,657

ABERDOUR, a small town in Fifeshire, Scotland, on the northern shore of the Frith of Forth, about ten miles north-west of Edinburgh, with which there is now a frequent and easy communication by steam-boats. In old times it belonged to the Viponts; in 1126 it was transferred to the Mortimers by marriage, and afterwards to the Douglases. William, lord of Liddesdale, surnamed the *Flower of Chivalry*, in the reign of David II. by charter conveyed it to James Douglas, ancestor of the present noble owner, the Earl of Morton. The monks of Inchcolm had a grant for a burial-place here from Allan de Mortimer, in the reign of Alexander III. It is a pleasantly situated town, and is greatly resorted to in summer for sea-bathing. Coarse cloths are manufactured to a small extent in the village. The population in 1831 amounted to 1751.

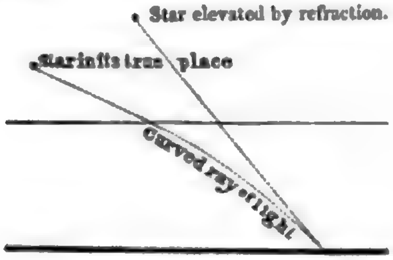
ABERFORD, a market-town in the west riding of Yorkshire, about a mile in length, and pretty well built. It is near a Roman road, which is raised very high, and not far from the river Cock, between which and the town there is the foundation of an old castle still visible. It is 181 miles north by west from London. Long. 2. 45. W. Lat 53. 52. N. The population in 1811 was 775; in 1821, 900; and in 1831, 925.

ABERGAVENNY, a town in Monmouthshire, seated at the confluence of the rivers Usk and Gavenny. It is surrounded with a wall, and had once a castle. It carries on a considerable trade in flannels, which are brought hither for sale from the other parts of the county. It is 142 miles distant from London. Long. 3.W. Lat. 51. 47. N. Abergavenny appears to have been the *Gibbanium* of Antoninus, and the town of Usk his *Burrium*. The population in 1811 was 2864; in 1821, 3321; and in 1831, 4230.

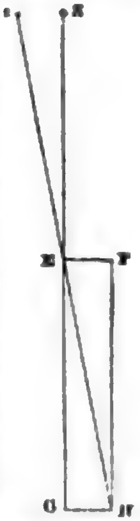
ABERNETHY, JOHN, an eminent dissenting minister, was the son of Mr John Abernethy, a dissenting minister in Coleraine, and was born there on the 19th of October 1680. When about nine years of age he was separated from his parents, his father being obliged to attend some public affairs in London; and his mother, to shelter herself from the mad fury of the Irish rebels, retiring to Derry, a relation who had him under his care, having no opportunity of conveying him to her, carried him to Scotland; and thus he escaped the hardships and dangers of the siege of Derry, in which Mrs Abernethy lost all her other children. He afterwards studied at the university of Glasgow, where he remained till he took the degree of master of arts; and, in 1708, he was chosen minister of a dissenting congregation at Antrim, in which situation he continued above 20 years. About the time of the Bangorian controversy (for which see HOADLEY), a dissension arose among his brethren in the ministry at Belfast, on the subject of subscription to the Westminster Confession of Faith. In this controversy he became a leader on the negative side, and incurred the censure of a general synod. The agitation of parties began to be also felt among the members of his congregation. Many of them deserted him; which induced him to accept of an invitation to settle in Dublin, where his preaching was much admired. Here he continued for ten years, respected and esteemed. But his labours were terminated by a sudden attack of the gout in the head, to which he had been subject; and he died in December 1740, in the 60th year of his age. His writings, like his character, are distinguished for candour, liberality, and manly sentiment. He published a volume of sermons on the Divine Attributes; after his death a second volume was published by his friends; and these were succeeded by four other volumes on different subjects, all of which have been greatly admired.

ABERNETHY, a town of Scotland, in Perthshire, situated at a short distance to the southward of the right bank of the river Tay, a little above the mouth of the Earne. It is of very ancient date, and is said to have been the seat of the Pictish kings; and there are some uncertain traditions of its existence prior to this period. It is distinguished by a curious piece of antiquity, a circular leaning tower 74 feet high and 16 in diameter, consisting of 64 courses of hewn stone. It continued long to be the see of an archbishop, which was afterwards transferred to St Andrews. The inhabitants are engaged in the manufacture of linen. The population in 1831 was 1776. Abernethy is seven miles from Perth.

ABERRATION, in *Astronomy*, a remarkable phenomenon, by which all the stars appear, at certain seasons of the year, to deviate in a slight degree from their true situation in the heavens, in consequence, as is now ascertained, of the motion of the light from every star combining itself with the motion in the eye of the observer, caused by the earth's annual revolution round the sun. All vision, it is well known, is performed by the particles or rays of light from any object striking against the eye, and the object invariably appears in that direction in which the rays finally impinge. Hence, for example, arise the effects of refraction, by which the heavenly bodies appear more elevated in the horizon than they really are; the rays of light, as they penetrate the atmosphere, bending gradually downwards towards the surface of the earth, so as at last to reach the eye of the spectator in a direction more inclined from the horizon than that in which they issue from the object: and thus the latter appears more elevated in the sky than it really is, as in the annexed sketch.



In a similar manner the rays of light which fall directly from the stars, in certain circumstances, owing to the motion of the earth, really impinge on the eye of a spectator in a direction somewhat oblique, so that they appear on this account in a situation different from what they really occupy; and this constitutes the aberration. Suppose, for example, the earth is moving in a direction at right angles to that of the light from any star, then it is evident there will be a mutual collision between them; the light will not only strike the eye of a spectator, but the eye will also strike the light; the effect will be exactly the same as if the eye had been at rest, and the light had been endowed with an equal motion in the contrary direction; so that in addition to its direct motion, it has also a slight motion laterally; and the true direction of the impact, therefore, or of the compound motion of the light, according to the well-known laws of the composition of forces, will be the diagonal of the rectangle, the sides of which represent the directions and velocities of the light and of the eye, as in the annexed sketch, where S E represents the direction and velocity of the light, F E the direction and velocity of the motion of the earth, and E F, therefore, the direction and velocity of the contrary motion in the light, the earth being supposed at rest. When the light arrives at the eye therefore at E, it has not only the direct motion S E or E G, which is made by construction equal to S E, but also a lateral motion E F; so that the compound motion will be represented by the diagonal E H, which is the true direction in which the light will really impinge on the eye; so that the star, instead of appearing at S, will appear at *s*, as far in advance of its true position as the earth has moved in the time the light travels from the star to the eye. To determine the amount of this aberration, therefore, we have only to compare the motion of light with that of the earth in its orbit. Now, from the celebrated discovery of the Danish astronomer Roemer, regarding the successive propagation of light, as found by the observations of the eclipses of Jupiter's satellites at different seasons of the year, it appears that light actually employs about 15 minutes to travel from the one circumference to the other of the earth's orbit; and from other still more accurate observations, its velocity has been determined at about 194,000 miles per second, while the mean velocity of the earth in her orbit does not exceed 19 miles. Hence it is easy to calculate that the aberration in this case will amount to an angle of about 20″ of a degree; and this case in which the earth's motion is perpendicular to that of the light is that in which the aberration is the greatest of all; for, as the motion of the earth becomes oblique to that of the light, the aberration gradually diminishes, until at last it disappears altogether, when the two motions become in one straight line, that is, when the earth is moving either directly from or directly towards the stars. In all cases the apparent direction of the stars will be in the diagonal of the parallelogram, the sides of which represent the direction and the relative motions of the light and of the earth.



The aberration of light having been discovered by means of the telescope, this has given rise to a familiar illustration of the subject, which it may be proper to state. It is evident, that before the star can be visible in the telescope, the light in its progress through it must be continually in the axis. Were the telescope, therefore, affected with any considerable lateral motion, this could not take place if the telescope were held directly up to the star; because, though the light might enter the telescope in the axis, the lateral motion would quickly withdraw the axis from the line of the light, which would strike against the side of the telescope and never reach the eye. If, for example, the light moved successively to the points A, B, C, D, E, while the telescope or tube moved successively parallel to itself into the positions E A, F*f*, G*g*, H*h*, I*i*; then the light entering at A, by the time it reaches B the tube is off into the position F*f*, and by the time it could reach E the tube is removed to I *i*; so that it is evident the star will not be visible at all in the true direction of the light. In order that this may always remain in the telescope, and traverse it from end to end, this must be set in the position E *i*, oblique to E A; then the light entering at *i*, *Fig.* 2. will advance to *b* in the same time that the axis of the tube advances parallel to itself to F *f*; so that the light will still remain in the axis. In the same manner the light and the tube will continue to advance by proportional steps till the former reaches the eye, where the star will appear in the direction of the tube, and that as formerly in the diagonal of the parallelogram formed by the directions and velocities of the two motions. Another illustration was suggested by Clairaut in the *Mémoires de l'Académie des Sciences* for the year 1746, by supposing drops of rain to fall rapidly and quickly after each other from a cloud, under which a person moves with a very narrow tube; in which case, it is evident that the tube must have a certain inclination, in order that a drop which enters at the top may fall freely through the axis of the tube, without touching the sides of it; which inclination must be more or less, according to the velocity of the drops in respect to that of the tube: then the angle made by the direction of the tube and of the falling drops is the aberration arising from the combination of those two motions.

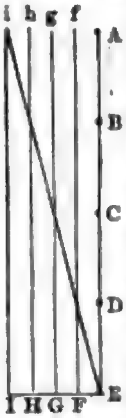
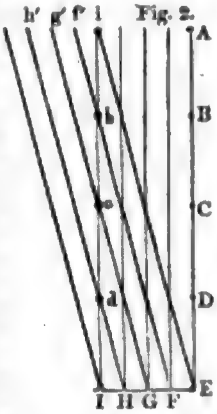
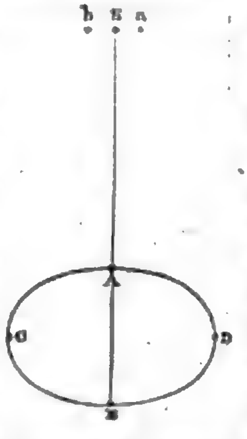


Fig. 2.



In all cases it will be observed the aberration takes place in the direction of the earth's motion. Hence it is easy to deduce, from what we have stated, the effects on the different stars. Consider, for example, those situated in the pole of the ecliptic. To the rays of light from these, the earth's motion will always be at right angles; the aberration on them, therefore, will always be of the same amount, viz. about 20″; but as the earth changes the direction of its motion along the ecliptic, the aberration will change its direction also, so that the star will appear to move in a little orbit, similar to, and parallel with the ecliptic; the apparent situation of the star revolving annually round the true place, as the earth revolves round the sun. Consider again the stars situated in the plane of the ecliptic. To the rays of light from these, the earth's motion will be at one time at right angles, as at A and B in the annexed sketch, and at another in the same direction, as at C and D; for in all these cases we may hold the dimensions of the earth's orbit as nothing compared with the distance of the star. At A, therefore, the earth being supposed to move in the direction A D B, so as to make the star appear at *a*, the aberration will be 20″ in the direction S *a*, and at B 20″ in the direction S *b*, so as to make the star appear at *b*, while at C and D it will be nothing, and the star will appear in its true place at S. The apparent situation will, therefore, appear annually to oscillate on each side of the true, to the extent of 20″. Between the two extremes therefore, namely, the *pole* of the ecliptic, where the aberration causes the star to revolve in a circle, and the *plane* of the ecliptic, where it causes it to oscillate in a straight line, the stars will all describe elliptic curves, elongated 40″ in a direction parallel to the plane of the ecliptic, and the breadth or lesser axis diminishing continually from the pole towards the plane of the ecliptic, where the curve passes into a straight line. These motions in the stars are confirmed by the observations of astronomers, (see ASTRONOMY,) and they furnish one among many other beautiful examples of that remarkable and perfect accordance which in this science subsists everywhere between theory and fact. The effects of aberration also present a striking, and one of the few direct proofs which astronomy furnishes of the motion of the earth, these being quite unaccountable on any other hypothesis.



Such are the principal phenomena of aberration. This great discovery, one of the finest in modern astronomy, we owe to the accuracy and ingenuity of the distinguished astronomer Dr Bradley, who was led to it in the year 1727, by the result of some observations which he made, with a view of determining the annual parallax of the fixed stars. See PARALLAX.

The annual motion of the earth about the sun had been much doubted and warmly contested. The defenders of that motion, among other proofs of the reality of it, conceived the idea of adducing an incontestible one from the annual parallax of the fixed stars, if the stars should be within such a distance, or if instruments and observations could be made with such accuracy, as to render that parallax sensible. And with this view various attempts have been made. Before the observations of M. Picard, made in 1672, it was the general opinion that the stars did not change their position during the course of a year. Tycho Brahe and Ricciolus fancied that they had assured themselves of it from their observations; and from thence they concluded that the earth did not move round the sun, and that there was no annual parallax in the fixed stars. M. Picard, in the account of his *Voyage d'Uranibourg*, made in 1672, says that the pole star, at different times of the year, has certain variations, which he had observed for about 10 years, and which amounted to about 40″ a year: from whence some, who favoured the annual motion of the earth, were led to conclude that these variations were the effect of the parallax of the earth's orbit. But it was impossible to explain it by that parallax, because this motion was in a manner contrary to what ought to follow only from the motion of the earth in her orbit.

In 1674 Dr Hooke published an account of observations which he said he had made in 1669, and by which he had found that the star γ Draconis was 23″ more northerly in July than in October; observations which, for the present, seemed to favour the opinion of the earth's motion, although it be now known that there could not be any truth or accuracy in them.

Flamsteed having observed the pole star with his mural quadrant, in 1680 and the following years, found that its declination was 40″ less in July than in December; which observations, although very just, were yet, however, improper for proving the annual parallax; and he recommended the making of an instrument of 15 or 20 feet radius, to be firmly fixed on a strong foundation, for deciding a doubt which was otherwise not soon likely to be brought to a conclusion.

In this state of uncertainty and doubt, then, Dr Bradley, in conjunction with Mr Samuel Molineux, in the year 1725, formed the project of verifying, by a series of new observations, those which Dr Hook had communicated to the public almost 50 years before. And as it was his attempt that chiefly gave rise to this, so it was his method in making the observations, in some measure, that they followed; for they made choice of the same star, and their instrument was constructed upon nearly the same principles: but had it not greatly exceeded the former in exactness, they might still have continued in great uncertainty as to the parallax of the fixed stars. For this, and many other convenient and useful astronomical instruments, philosophers are indebted to the ingenuity and accuracy of Mr Graham.

The success of the experiment evidently depending so much on the accuracy of the instrument, this became a leading object of consideration. Mr Molineux's apparatus then having been completed, and fitted for observing, about the end of November 1725, on the third day of December following, the bright star in the head of Draco, marked γ by Bayer, was for the first time observed, as it passed near the zenith, and its situation carefully taken with the instrument. The like observations were made on the fifth, eleventh, and twelfth days of the same month; and there appearing no material difference in the place of the star, a further repetition of them, at that season, seemed needless, it being a time of the year in which no sensible alteration of parallax, in this star, could soon be expected. It was therefore curiosity that chiefly urged Dr Bradley, who was then at Kew, where the instrument was fixed, to prepare for observing the star again on the 17th of the same month; when, having adjusted the instrument as usual, he perceived that it passed a little more southerly this day than it had done before. Not suspecting any other cause of this appearance, it was ascribed to the uncertainty of the observations, and that either this or the foregoing was not so exact as had been supposed. For which reason they proposed to repeat the observation again, to determine from what cause this difference might proceed: and upon doing it, on the 20th of December, the doctor found that the star passed still more southerly than at the preceding observation. This sensible alteration surprised them the more, as it was the contrary way from what it would have been had it proceeded from an annual parallax of the star. But being now pretty well satisfied that it could not be entirely owing to the want of accuracy in the observations, and having no notion of any thing else that could cause such an apparent motion as this in the star, they began to suspect that some change in the materials or fabric of the instrument itself might have occasioned it. Under these uncertainties they remained for some time; but being at length fully convinced, by several trials, of the great exactness of the instrument, and finding, by the gradual increase of the star's distance from the pole, that there must be some regular cause that produced it, they took care to examine very nicely, at the time of each observation, how much the variation was; till about the beginning of March 1726, the star was found to be 20″ more southerly than at the time of the first observation: it now indeed seemed to have arrived at its utmost limit southward, as in several trials, made about this time, no sensible difference was observed in its situation. By the middle of April it appeared to be returning back again towards the north; and about the beginning of June it passed at the same distance from the zenith as it had done in December, when it was first observed.

From the quick alteration in the declination of the star at this time, increasing about one second in three days, it was conjectured that it would now proceed northward, as it had before gone southward, of its present situation; and it happened accordingly; for the star continued to move northward till September following, when it again became stationary; being then near 20″ more northerly than in June, and upwards of 39″ more northerly than it had been in March. From September the star again returned towards the south, till, in December, it arrived at the same situation in which it had been observed twelve months before, allowing for the difference of declination on account of the precession of the equinox.

This was a sufficient proof that the instrument had not been the cause of this apparent motion of the star; and yet it seemed difficult to devise one that should be adequate to such an unusual effect. A nutation of the earth's axis was one of the first things that offered itself on this occasion; but it was soon found to be insufficient; for though it might have accounted for the change of declination in γ Draconis, yet it would not at the same time accord with the phenomena observed in the other stars, particularly in a small one almost opposite in right ascension to γ Draconis, and at about the same distance from the north pole of the equator: for though this star seemed to move the same way as a nutation of the earth's axis would have made it, yet changing its declination but about half as much as γ Draconis in the same time, as appeared on comparing the observations of both made on the same days, at different seasons of the year, this plainly proved that the apparent motion of the star was not occasioned by a real nutation; for had this been the case, the alteration in both stars would have been nearly equal.

The great regularity of the observations left no room to doubt, but that there was some uniform cause by which this unexpected motion was produced, and which did not depend on the uncertainty or variety of the seasons of the year. Upon comparing the observations with each other, it was discovered that, in both the stars above mentioned, the apparent difference of declination from the *maxima* was always nearly proportional to the versed sine of the sun's distance from the equinoctial points. This was an inducement to think that the cause, whatever it was, had some relation to the sun's situation with respect to those points. But not being able to frame any hypothesis sufficient to account for all the phenomena, and being very desirous to search a little further into this matter, Dr Bradley began to think of erecting an instrument for himself at Wanstead; that, having it always at hand, he might with the more ease and certainty inquire into the laws of this new motion. The consideration likewise of being able, by another instrument, to conform the truth of the observations hitherto made with that of Mr Molineux, was no small inducement to the undertaking; but the chief of all was, the opportunity he should thereby have of trying in what manner other stars should be affected by the same cause, whatever it might be. For Mr Molineux's instrument being originally designed for observing γ Draconis, to try whether it had any sensible parallax, it was so contrived as to be capable of but little alteration in its direction; not above seven or eight minutes of a degree: and there being but few stars within half that distance from the zenith of Kew bright enough to be well observed, he could not, with his instrument, thoroughly examine how this cause affected stars that were differently situated with respect to the equinoctial and solstitial points of the ecliptic.

These considerations determined him; and by the contrivance and direction of the same ingenious person, Mr Graham, his instrument was fixed up the 19th of August 1727. As he had no convenient place where he could make use of so long a telescope as Mr Molineux's, he contented himself with one of but little more than half the length, namely of 12 feet and a half, the other being 24 feet and a half long, judging from the experience he had already had, that this radius would be long enough to adjust the instrument to a sufficient degree of exactness: and he had no reason afterwards to change his opinion; for by all his trials he was very well satisfied, that when it was carefully rectified, its situation might be securely depended on to half a second. As the place where his instrument was hung in some measure determined its radius, so did it also the length of the arc or limb, on which the divisions were made, to adjust it; for the arc could not conveniently be extended farther, than to reach to about 6½ degrees on each side of the zenith. This however was sufficient, as it gave him an opportunity of making choice of several stars, very different both in magnitude and situation; there being more than two hundred, inserted in the British Catalogue, that might be observed with it. He needed not, indeed, to have extended the limb so far, but that he was willing to take in *Capella*, the only star of the first magnitude that came so near his zenith.

His instrument being fixed, he immediately began to observe such stars as he judged most proper to give him any light into the cause of the motion already mentioned. There was a sufficient variety of small ones, and not less than twelve that he could observe through all seasons of the year, as they were bright enough to be seen in the day-time, when nearest the sun. He had not been long observing, before he perceived that the notion they had before entertained, that the stars were farthest north and south when the sun was near the equinoxes, was only true of those stars which are near the solstitial colure. And after continuing his observations a few months, he discovered what he then apprehended to be a general law observed by all the stars, namely, that each of them became stationary, or was farthest north or south, when it passed over his zenith at six of the clock, either in the evening or morning. He perceived also, that whatever situation the stars were in with respect to the cardinal points of the ecliptic, the apparent motion of every one of them tended the same way when they passed his instrument about the same hour of the day or night; for they all moved southward when they passed in the day, and northward when in the night: so that each of them was farthest north when it came in the evening about six of the clock, and farthest south when it came about six in the morning.

Though he afterwards discovered that the maxima, in most of these stars, do not happen exactly when they pass at those hours; yet, not being able at that time to prove the contrary, and supposing that they did, he endeavoured to find out what proportion the greatest alterations of declination, in different stars, bore to each other; it being very evident that they did not all change their inclination equally. It has been before noticed, that it appeared from Mr Molineux's observations, that *γ Draconis* changed its declination above twice as much as the before-mentioned small star that was nearly opposite to it; but examining the matter more nicely, he found that the greatest change in the declination of these stars was as the sine of the latitude of each star respectively. This led him to suspect that there might be the like proportion between the *maxima* of other stars; but finding that the observations of some of them would not perfectly correspond with such an hypothesis, and not knowing whether the small difference he met with might not be owing to the uncertainty and error of the observations, he deferred the further examination into the truth of this hypothesis till he should be furnished with a series of observations made in all parts of the year; which would enable him not only to determine what errors the observations might be liable to, or how far they might safely be depended on, but also to judge whether there had been any sensible change in the parts of the instrument itself.

When the year was completed, he began to examine and compare his observations; and having satisfied himself as to the general laws of the phenomena, he then endeavoured to find out the cause of them. He was already convinced that the apparent motion of the stars was not owing to a nutation of the earth's axis. The next circumstance which occurred to him, was an alteration in the direction of the plumb-line, by which the instrument was constantly adjusted; but this, upon trial, proved insufficient. Then he considered what refraction might do; but here also he met with no satisfaction. At last, in a state of great perplexity, the discovery of Roëmer occurred to him, that the motion of light, however incredibly swift, was not altogether instantaneous, but took a certain interval in passing from the sun to the earth; and then the truth flashed on his mind. He immediately perceived that the motion of the earth being also extremely rapid, might have though a small yet a perceptible relation to that of light. and might thus come by combining its influence to affect the direction of the visual rays, and with them the apparent situation of the stars, in the manner above explained. Pursuing this happy idea, he calculated the aberration from the relative velocities of the earth and of light, and comparing it with his own observations, was delighted to find them agree in every particular; so that no doubt could remain of the truth of his discovery. For further information on this subject, see ASTRONOMY, in this Encyclopædia; and also the following works, *Phil. Transactions*, vol. xxxv.; vol. lxxii. *Mem. Acad. Paris*, 1737; *Mem. Acad. Berlin*, tom. ii.; *Nov. Acad. Petrop.* tom. i.; *Connoissances des Temps*, 1788; T. Simpson's *Essays on Several Subjects*, 1740; *Boscovichii Opera*, tom. v. 1785; *Traité sur l'Aberration*, par Fontaines des Crutes; Cagnoli's *Trigonometrie;* Vince's *Astronomy*, vol. i.; Delambre, *Astronomie;* Woodhouse's *Astronomy*. (c.)

ABERRATION *of the Planets*. This is quite of the same nature with that of the stars, only that its amount and direction are greatly affected by the motion of the planet itself combining itself with that of the earth, and producing on the whole a more complex result. When the planet is stationary, the aberration disappears altogether, because the light itself, participating of the motion of the planet, strikes the earth not only with its usual direct motion, but also with a lateral motion exactly the same as that of the earth itself. The eye of the spectator, therefore, and the light have the same motion laterally; and thus the effect is quite the same as if they had relatively no lateral motion at all. It is the same as if both the earth and the planet were at rest, and therefore there cannot be any aberration. In every other case, the aberration is determined by combining the motion of light not only with the earth's, but with the planet's motion also; and doing this it is found, that in every case the aberration is equal to the motion of the planet about the earth or its geocentric motion, during the interval that light employs in passing from the planet to the earth. Thus, in the sun, the aberration in longitude is constantly 20'', that being the space moved by the sun, or, what is the same thing, by the earth, in 8' 7'', the time in which light passes from the sun to the earth. In like manner, knowing the distance of any planet from the earth, by proportion it will be, as the distance of the sun is to the distance of the planet, so is 8' 7'' to the time of light passing from the planet to the earth: then computing the planet's geocentric motion in this time, that will be the aberration of the planet, whether it be in longitude, latitude, right ascension, or declination.

Since the motion of the planets affects so much the aberration, ought not the motion of the fixed stars relatively to our system, if they have any, as some have suspected, be rendered sensible in this manner? Their prodigious distance has hitherto rendered these motions, if they do exist, almost insensible. But this would not affect the motion of light. This element flies through the remotest parts of the system; and if it be really material, the motion with which it is propelled from one point must continue for ever afterwards to affect it, unless opposed or modified by extraneous influence. If the stars, therefore, have any motion laterally in respect of the earth, so will the light which issues from them, and which, preserving undiminished its original impulse, must strike the eye of a spectator on the earth not only with a direct motion, but also with one to the right or left similar to that of the star; and this ought to affect the aberration just in the same manner as if the star were no farther off than any of the planets. The same thing would be observed if the earth, along with the whole solar system, as the late Dr Herschel and other astronomers have attempted to prove, be advancing forward among the stars. Since, however, no such effect has ever been noticed, it would seem to follow, that the stars, as well as the sun, are really at rest; or if they have any motion, it is but a slow one, even compared with that of the earth or the planets round the sun. This is certainly a curious speculation, which we have never seen discussed by astronomers. See ASTRONOMY. (c.)

ABERRATION, in *Optics*, a certain deviation in the rays of light, from the true or geometrical focus of reflection or refraction in curved specula or lenses, arising from two causes, viz. 1*st*, the figure of the speculum or lens, giving rise to what is called the *spherical* aberration; and, 2*d*, the unequal refrangibility of the rays of light giving rise, in lenses only however, to a far more material, and in other respects inconvenient aberration, termed the *chromatic*, or the aberration of *colour*, or of *refrangibility*. The object of all specula or lenses, is to collect the rays of light proceeding from any object into a single point, so as to form there a distinct image of the object, either enlarged or diminished, according as our purposes may require: and on this principle depends the whole operation of the telescope, the microscope, and other optical instruments. The more completely the rays can be collected into a focus, so much the more distinctly, in every case, does the image of the object appear at that point, and so much the more perfect is the operation of the instrument. But there are certain curves or figures in the speculum or lens, which are necessary to produce this effect. Parallel rays, for example, can only be collected into one focus by a reflecting speculum of a parabolic form, or by a refracting lens of parabolic or hyperbolic, combined with spherical curves: all other forms cause more or less a dispersion or aberration of the rays from the focus. In practice, however, it is extremely difficult to form the lenses into these complex curves; and as the spherical form is much more easily constructed, and as the aberration from it is not generally attended with serious inconvenience, this form has been universally adopted. The amount of the aberration is measured either by the distance *longitudinally* at which the rays meet from the true focus, or by the distance *laterally* by which they are dispersed from it. In all double convex lenses of equal spheres, the longitudinal aberration of the extreme ray is $1\frac{3}{8}$ of the thickness of the lens. The smallest aberration takes place when the radii of the spheres are as 1 to 6, the more convex surface being exposed to the rays; in that case, it is only $1\frac{1}{12}$th of the thickness of the lens. See OPTICS.

The aberration of refrangibility is of far more importance. It arises from this circumstance, that in a homogeneous lens of glass the violet rays are greatly more refracted than the red. The latter are therefore thrown to a greater distance, and the others in proportion almost all deviating from the true focus: hence arises that confusion of images, and that fringe of extraneous colour with which objects are surrounded when seen through glasses of this description, which has ever formed the great obstacle to the perfection of the refracting telescope; so much so, that Sir Isaac Newton, misled at the time by a partial view of the subject, and others after him, were led to despair of success in correcting this defect, and thus directed their chief attention to those of the *reflecting* kind. Subsequent discoveries, however, led to the invention of *achromatic* glasses, by which the refracting telescope has been wonderfully improved; and some important experiments, we understand, are now going on at the Royal Institution in London, by M. Faraday, under the direction of the Board of Longitude, in the manufacture of a more perfect glass than has hitherto been used, from which we may hope to see these instruments carried to a yet higher degree of perfection. See ACHROMATIC GLASSES; also *Phil. Trans.* vols. xxxv. xlviii., and from l. to lv.; *Mem. Acad. Par.* from 1737 to 1770; *Mem. Acad. Berlin*, from 1746 to 1798; *Nov. Comment. Petrop.* 1762; *Mem. Irish Academy*, vol. iv.; *Edinb. Trans.* vol. iii.; *Comment. Gottingen*, vol. xiii.; *Huygenii Dioptrica*; *Boscovichii Opera*; *Klingensteirna de Aberrationibus Luminis*, &c. (c.)

ABERYSTWITH, a market-town of Cardiganshire, in Wales, seated on the Ridal, near its confluence with the Istwith, where it falls into the sea. It has a great trade in lead, and a considerable fishery of whiting, cod, and herrings. It was formerly surrounded with walls, and fortified with a castle; but both are now in ruins. Its distance from London is 203 miles W. N. W. Long. 4. 20. W. Lat. 52. 17. N. The population amounted in 1821 to 4509, and in 1831 to 4128.

ABESTA, or AVESTA, the name of one of the sacred books of the Persian magi, which they ascribe to their great founder Zoroaster. The Abesta is a commentary on two others of their religious books, called *Zend* and *Pazend*; the three together including the whole system of the Ignicolæ or worshippers of fire.

ABETTOR, a law term implying one who encourages another to the performance of some criminal action, or who is art or part in the performance itself. Treason is the only crime in which abettors are excluded by law, every individual concerned being considered as a principal. It is the same with *art-and-part* in the Scotish law.

ABEX, a country of Africa, bordering on the Red Sea, by which it is bounded on the east. It has Nubia or Sennar on the north; Sennar and Abyssinia on the west; and Abyssinia on the south. Its principal towns are Suaquem and Arkeko. It is subject to the Turks, and has the name of the beglerbeglik of Habeleth. It is about five hundred miles in length and one hundred in breadth; is a mountainous country, sandy, barren, and unhealthy, much infested with wild beasts; and the forests abound with ebony trees.

ABEYANCE, in *Law*, the expectancy of an estate. Thus, if lands be leased to one person for life, with reversion to another for years, the remainder for years is in abeyance till the death of the lessee.

ABGAR, or Abgarus, a name given to several of the kings of Edessa in Syria. The most celebrated of them was one who, it is said, was contemporary with Jesus Christ; and who, having a distemper in his feet, and hearing of Jesus's miraculous cures, requested him by letter to come and cure him. Eusebius,[1] who believed that this letter was genuine, and also an answer our Saviour is said to have returned to it, has translated them both from the Syriac, and asserts that they were taken out of the archives of the city of Edessa. The first is as follows:—"Abgarus, prince of Edessa, to Jesus the holy Saviour, who hath appeared in the flesh in the confines of Jerusalem, greeting. I have heard of thee, and of the cures thou hast wrought without medicines or herbs. For it is reported thou makest the blind to see, the lame to walk, lepers to be clean, devils and unclean spirits to be expelled, such as have been long diseased to be healed, and the dead to be raised; all which when I heard concerning thee, I concluded with myself, that either thou wast a God come down from heaven, or the Son of God sent to do these things. I have therefore written to thee, beseeching thee to vouchsafe to come unto me and cure my disease. For I have also heard that the Jews use thee ill, and lay snares to destroy thee. I have here a little city, pleasantly situated, and sufficient for us both. Abgarus." To this letter Jesus, it is said, returned an answer by Anannias, Abgarus's courier, which was as follows:—"Blessed art thou, O Abgarus! who hast believed in me whom thou hast not seen; for the Scriptures say of me, They who have seen me have not believed in me, that they who have not seen may, by believing, have life. But whereas thou writest to have me come to thee, it is of necessity that I fulfil all things here for which I am sent; and having finished them, to return to him that sent me: but when I am returned to him, I will then send one of my disciples to thee, who shall cure thy malady, and give life to thee and thine. Jesus." After Jesus's ascension, Judas, who is also named Thomas, sent Thaddeus, one of the seventy, to Abgarus; who preached the gospel to him and his people, cured him of his disorder, and wrought many other miracles: which was done, says Eusebius, A. D. 43.—Though the above letters are acknowledged to be spurious by the candid writers of the church of Rome, several Protestant authors, as Dr Parker, Dr Cave, and Dr Grabe, have maintained that they are genuine, and ought not to be rejected.

ABGILLUS, John, surnamed Prester John, was son to a king of the Friscii; and, from the austerity of his life, obtained the name of *Prester*, or Priest. He attended Charlemagne in his expedition to the Holy Land; but instead of returning with that monarch to Europe, it is pretended that he gained mighty conquests, and founded the empire of the Abyssines, called, from his name, the empire of Prester John. He is said to have written the history of Charlemagne's journey into the Holy Land, and his own into the Indies; but they are more probably trifling romances, written in the ages of ignorance.

ABIAD, Bahr el, a great river of interior Africa, which, at Halfaia, below Sennaar, joins the Bahr-el-Azrek, or river of Abyssinia; and the two united form the Nile of Egypt. The Abyssinian river was long considered by Europeans as the main stream; but more accurate observation has now clearly determined, that the Abiad, both as to magnitude and length of course, is entitled to the pre-eminence. Its sources, however, and the upper part of its course, have not been reached by any European. Brown, in Darfur, made the nearest approach to them, and was informed that they lay in a mountainous country called Donga, situated to the south, and inhabited by a savage people. It may be added, that, according to some theories, and even according to the prevailing belief in Northern Africa, the Abiad is a continuation of the great central stream which we call the Niger; but the observations of the recent mission seem to have divested this hypothesis of every probability. M. Ruppell, who lately visited some part of its lower course, describes it during the dry season as a dead flowing stream, and little more than a stagnant marsh. See Nile.

ABIAGA, a town in the corregimento of Alcaniz, and province or kingdom of Arragon, in Spain.

ABIANS, or Abii, anciently a people of Thrace, or (according to some authors) of Scythia. They had no fixed habitations, but led a wandering life; dwelling on waggons, which carried all their possessions. They lived on the flesh of their herds and flocks, on milk and cheese, chiefly on that of mare's milk. They were unacquainted with commerce, and only exchanged commodities with their neighbours. Besides these, many other qualities and habits are ascribed to them, which are justly regarded as fictitious.

ABIATHAR, high priest of the Jews, son to Ahimelech, who had borne the same office, and received David into his house. This so enraged Saul, who hated David, that he put Ahimelech to death, and 81 priests; Abiathar alone escaped the massacre. He afterwards was high priest, and often gave King David testimonies of his fidelity, particularly during Absalom's conspiracy, at which time Abiathar followed David, and bore away the ark. But after this he conspired with Adonijah, in order to raise him to the throne of King David his father; which so exasperated Solomon against him, that he divested him of the priesthood, and banished him, A. M. 3021, before Christ 1014.

ABIAUL, a town in Portugal, in the department of Thomar, province of Estremadura.

ABIB, signifying an ear of corn, a name given by the Jews to the first month of their ecclesiastical year, afterwards called *Nisan*. It commenced at the vernal equinox; and according to the course of the moon, by which their months were regulated, answered to the latter part of our March and beginning of April.

ABIES, the Fir-Tree.

ABIGEAT, an old law term, denoting the crime of stealing cattle by droves or herds. This crime was severely punished; the delinquent being often condemned to the mines, banishment, and sometimes capitally.

ABIHU, brother to Nadab, and son to Aaron. The two former had the happiness to ascend Mount Sinai with their father, and there to behold the glory of God: but afterward putting strange fire into their censers, instead of the sacred fire commanded by God, fire rushing upon them killed them. Though all the people bewailed this terrible catastrophe, Moses forbade Aaron and his two sons Eleazar and Ithamar to join in the lamentation.

ABIKSCHAN, a large fresh water lake near the river Sumy, in the circle of Osnsk, whose surplus water runs to the Irtisch. It is within the government of Tobolsk in Siberia.

ABIMELECH, king of Gerar, a country of the Philistines, was contemporary with Abraham. This patriarch and his family being there, his wife Sarah, though 90 years of age, was not safe in it; for Abimelech carried her off, and was so enamoured of her, that he resolved to marry her. Abraham did not declare himself Sarah's husband, but gave out she was his sister. But the king being warned in a dream that she was married to a prophet, and that he should die if he did not restore her to Abraham, the king obeyed; at the same time reproving Abraham for his disingenuity; who thereupon, among other excuses, said she was really his sister, being born of the same father, though of a different mother. Abimelech afterwards gave considerable presents to Abraham; and a covenant, that of Beersheba, was entered into between them, A. M. 2107. After the death of Abraham, there being a famine in the neighbouring countries, Isaac his son also withdrew into Gerar, which was then likewise governed by a king called

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[1] *Hist. Eccl.* lib. i. cap. 13.

ABIMELECH, probably the successor of the former. Here Rebekah's beauty forced her husband to employ Abraham's artifice. Abimelech, discovering that they were nearly related, chid Isaac for calling his wife his sister; and at the same time forbade all his subjects, upon pain of death, to do the least injury to Isaac or Rebekah. Isaac's prosperity lost him the king's friendship, and he was desired to go from among them. He obeyed; but Abimelech afterwards entered into a covenant with him, A. M. 2200.

ABIMELECH, the natural son of Gideon, by his concubine. His violent acts and death are recorded in Judges, chap. ix. A. M. 2769.

ABINGDON, a market-town in Berkshire, situated on a branch of the Thames, derives its name from an ancient abbey. The streets, which are well paved, terminate in a spacious area, in which the market is held; and in the centre of this area is the market-house, which is supported on lofty pillars, with a large hall of freestone above, in which the summer assizes for the county are held, and other public business done, the Lent assizes being held at Reading. It has two churches; one dedicated to St Nicholas, and the other to St Helena: the latter is adorned with a spire, and both are said to have been erected by the abbots of Abingdon. Here are also two hospitals, one for six, and the other for thirteen poor men, and as many poor women; a free school; and a charity school. The town was incorporated by Queen Mary. It sends one member to parliament, who is chosen by the inhabitants at large not receiving alms. Its great manufactures are sail-cloth, sacking, and especially malt, large quantities of which are sent by water to London. It is seven miles south of Oxford, 47 east of Gloucester, and 55 west of London. This town is supposed by Bishop Gibson to be the place called in the Saxon annals, *Cloveshoo*. Long. 1. 12. W. Lat. 51. 42. N. The population in 1811 was 4696; in 1821, 5137; and in 1831, 5259.

ABINTESTATE, in *Law*, is applied to a person who inherits the right of one who died intestate, or without making a will.

ABIPONIANS, a tribe of American Indians, who formerly inhabited the district of *Chaks* in Paraguay; but the hostilities of the Spaniards have now obliged them to remove southward into the territory lying between Santa Fe and St Jago. M. Dobrizhoffer, who lived seven years in their country, informs us, in his account of them published in 1785, that they are not numerous, the whole nation not much exceeding 5000; for which he assigns as a reason an unnatural custom among their women of sometimes destroying their own children, from motives of jealousy lest their husbands should take other mates during the long time they give suck, which is not less than two years. They are naturally white, but, by exposure to the air and smoke, become of a brown colour. They are a strong and hardy race of people, which our author attributes to their marrying so late, an Abiponian seldom or never thinking of marriage till 30 years of age. They are greatly celebrated on account of their chastity and other virtues; though, according to our author, they have no knowledge of a Deity. They make frequent incursions into the territories of the Spaniards, mounted on the horses which run wild in those parts. They have a kind of order of chivalry for their warriors; and are so formidable, that 100 of their enemies will fly before ten of these horsemen. The hatred which these savages, whose manners, though rude and uncultivated, are in many respects pure and virtuous, bear to the Spaniards, is invincible. "These pretended Christians," says our author, "who are the scum of the Spanish nation, practise every kind of fraud and villany among these poor barbarians; and their corrupt and vicious morals are so adapted to prejudice the Abiponians against the Christian religion, that the Jesuit missionaries have, by a severe law, prohibited any Spaniard from coming, without a formal permission, into any of their colonies." From his account of the success of the Jesuits in converting them to Christianity, however, it does not appear that they have been able to do more than bribe them to a compliance with the ceremonies of the Popish superstition; so that in general they are quite ignorant and uncivilized; a most striking instance of which is, that in counting they can go no further than three; and all the art of the Jesuits to teach them the simplest use and expression of numbers has proved unsuccessful. Dobrizhoffer's account of this people was translated into English by Mr Southey, and published in 1822, in 3 vols. 8vo.

ABIRAM, a seditious Levite, who, in concert with Korah and Dathan, rebelled against Moses and Aaron, in order to share with them in the government of the people; when Moses ordering them to come with their censers before the altar of the Lord, the earth suddenly opened under their feet, and swallowed up them and their tents; and at the same instant fire came from heaven and consumed 250 of their followers. Numb. chap. xvi.

ABISHAI, son of Zeruiah, and brother to Joab, was one of the celebrated warriors who flourished in the reign of David: he killed with his own hand 300 men, with no other weapon but his lance; and slew a Philistine giant, the iron of whose spear weighed 300 shekels. 1 Sam. chap. xxvi. 2 Sam. chap. xxiii.

ABJURATION, in our ancient customs, implied an oath taken by a person guilty of felony, and who had fled to a place of sanctuary, whereby he solemnly engaged to leave the kingdom for ever.

ABJURATION is now used to signify the renouncing, disclaiming, and denying upon oath, the Pretender to have any kind of right to the crown of these kingdoms.

ABJURATION of Heresy, the solemn recantation of any doctrine as false and wicked.

ABLA, a town on the river Almeria, in the department of Guadix and province of Granada, in Spain.

ABLACH, a river in the grand duchy of Baden, in Germany, which soon falls into the Danube on the border of Wirtemberg.

ABLACQUEATION, an old term in *Gardening*, signifies the operation of removing the earth, and baring the roots of trees in winter, to expose them more freely to the air, rain, snow, &c.

ABLACTATION, among the ancient gardeners, the same with what is now called *Grafting by approach*, is a method of ingrafting, by which the scion of one tree being for some time united to the stock of another, is afterwards cut off, and, as it were, weaned from the parent tree.

ABLANCOURT. See Perrot.

ABLANQUEJO, a river of Spain, in the province of Soria, which falls into the Tagus.

ABLATIVE, in *Grammar*, the sixth case of Latin nouns. The word is formed from *auferre*, "to take away." Priscian also calls it the *comparative case;* as serving among the Latins for comparing, as well as taking away.

The ablative is opposite to the dative; the first expressing the action of taking away, and the latter that of giving.

In English, French, &c. there is no precise mark whereby to distinguish the ablative from other cases; and we only use the term from analogy to the Latin. Thus, in the two phrases, *the magnitude of the city*, and *he spoke much of the city;* we say, that *of the city* in the first is *genitive*, and in the latter *ablative;* because it would be so if the two phrases were expressed in Latin.

The question concerning the Greek ablative has been the subject of a famous literary war between two great grammarians, Frischlin and Crusius; the former maintaining, and the latter opposing, the reality of it. The dispute still subsists among their respective followers. The chief reason alleged by the former is, that the Roman writers often joined Greek words with the Latin prepositions which govern ablative cases, as well as with nouns of the same case. To which their opponents answer, that the Latins anciently had no ablative themselves, but instead thereof made use, like the Greeks, of the dative case; till at length they formed an ablative, governed by prepositions, which were not put before the dative: that, at first, the two cases had always the same termination, as they still have in many instances; but that this was afterwards changed in certain words. It is no wonder, then, that the Latins sometimes join prepositions which govern an ablative case, or nouns in the ablative case, with Greek datives, since they were originally the same; and that the Greek dative has the same effect as the Latin ablative.

Ablative Absolute, in *Grammar*, is a phrase detached or independent of the other parts of a sentence or discourse. In the Latin language it is frequent, and it has been adopted by the moderns.

ABLAY, a country of Great Tartary, governed by a Calmuck chief, but subject to Russia, to obtain its protection. It lies east of the river Irtisch, and extends 500 leagues along the southern frontiers of Siberia.

ABLE, or Abel, Thomas, chaplain to Queen Catherine, consort to Henry VIII. distinguished himself by his zeal in opposing the proceedings against that unfortunate princess for a divorce. For this purpose he wrote a piece entitled *Tractatus de non dissolvendo Henrici et Catharinæ matrimonio.* But the title of the book, according to Bishop Tanner, was *Invicta Veritas.* He took the degree of bachelor of arts at Oxford on the 4th of July 1513, and that of master of arts on the 27th July 1516. In 1534 he fell under a prosecution for being concerned in the affair of Elizabeth Barton, called the *Holy Maid of Kent.* This was an infamous impostor, suborned by the monks to use strange gesticulations, exhibit fictitious miracles, and to feign the gift of prophecy; and so well did she act her part, that she drew some persons of respectability to her interest: but being detected, she was condemned and executed, after discovering the names of her principal accomplices and instigators. On her account Able was charged with misprision of treason; and being also one of those who denied the king's supremacy over the church, he was apprehended and imprisoned. He was afterwards hanged, drawn, and quartered, at Smithfield, in 1540.

ABLECTI, in Roman antiquity, a select body of soldiers chosen from among those called Extraordinarii.

ABLEGMINA, in Roman antiquity, those choice parts of the entrails of victims which were offered in sacrifice to the gods. They were sprinkled with flour, and burnt upon the altar; the priests pouring some wine on them.

ABLITAS, a town of Spain, in the circle of Tudela, and kingdom or province of Navarre. It is situated near the lake of Santo.

ABLOCH, a river of Germany, rising in the principality of Hohenzollern-Sigmaringen, and runs to the Danube.

ABLUENTS, in *Medicine*, the same with diluters or Diluents.

ABLUTION, a ceremony in use among the ancients, and still practised in several parts of the world: it consisted in washing the body, which was always done before sacrificing, or even entering their houses. Ablutions appear to be as old as any ceremonies, and external worship itself. Moses enjoined them, the heathens adopted them, and Mahomet and his followers have continued them; thus they have got footing among most nations, and make a considerable part of many established religions.

ABNER, the son of Ner, father-in-law to Saul, and general of all his forces, served him on all occasions with fidelity and courage. After the death of that prince, Abner set Ishbosheth, Saul's son, on the throne. A war breaking out between the tribe of Judah, who had elected David king, and Israel, Abner marched against that prince with the flower of his troops, but was defeated. Abner afterward, being disgusted, went over to David, and induced the chiefs of the army and the elders of Israel to declare for him. He was received by David with every mark of affection, which gave offence to Joab, by whom he was insidiously put to death, A. M. 2956.

ABNOBA, now Abenow, in *Geography*, a long range of mountains in Germany, extending from the Rhine to the Necker, and having different names according to the different countries through which they stretch. About the river Maine they are called the *Oden* or *Otenwald;* between Hesse and Franconia, the *Spessart;* and about the duchy of Wirtemberg, where the Danube takes its rise, they receive the name of *Baar.*

ABO, a circle in the province of Finland, recently transferred to Russia from Sweden. By the new division, it extends over 12,145 square miles, between Lat. 59. 50. and 62. 20. N. and Long. 19. 10. and 23. 46. E. It is bounded on the north by the circle of Wasa; on the east by Helsingfors; on the south by the Gulf of Finland; on the south-east by the Baltic Sea; and on the west by the Gulf of Bothnia, in which the Aland group of islands comprehended in this circle are situated. It contains 6 cities, and 4960 hamlets. The inhabitants, at the census of 1805, were 207,960; of whom 18,591 lived in the cities, and the remainder in the country places. On the sea-coast, and on the eastern side of the circle, it is rather hilly; but the centre is chiefly a level country. The land is of medium fertility, producing rye, potatoes, hemp, flax, hops, and tobacco. The forests produce plants, pitch, and tar, and some potash. The coasts yield abundance of fish. It is divided into 9 horads or baronies.

ABO, a city, the capital of the late Swedish, but now Russian, province of Finland. The river Aurajchi divides it into two parts. By a most extensive fire in November 1827, nearly the whole city was destroyed, with the public buildings, including the university, and its valuable library. Before this calamity, Abo contained 1100 houses and 11,300 inhabitants, was the see of a bishop, and the chief trading port of Finland. The entrance of the Aurajchi is defended by a castle. Vessels drawing 9 or 10 feet water go up to the town; but those drawing more anchor at 3 miles south-west of the river, where there is a good harbour; and thence the goods are sent by small craft to Abo. The great church is in Lat. 60. 27. 14. N. and in Long. 22. 18. 10. E. from Greenwich.

ABOARD, the inside of a ship. Hence any person who enters a ship is said to *go aboard:* but when an enemy enters in the time of battle, he is said to *board;* a phrase which always implies hostility.—To *fall aboard of*, is to strike or encounter another ship when one or both are in motion, or to be driven upon a ship by the force of the wind or current.—*Aboard-main-tack*, the order to draw the main-tack, *i. e.* the lower corner of the main-sail, down to the Chess-tree.

ABOCRO, or Aborrel, in *Geography*, a town near the river Ankobar or Cobre, on the African Gold Coast. It gives name to a republican province.

ABOD, a market town of Hungary, in the circle of hither Theiss, and the district of Erlau, where woollen manufactories are established.

ABOLA, in *Geography*, a division of the Agow, in Abyssinia, is a narrow valley, through which runs a river of the same name, whose waters receive many tributary streams from the lofty, rugged, and woody mountains that form the valley.

ABOLITION, in the Roman law, is the annulling a prosecution, or legal accusation: and in this sense it is different from amnesty; for, in the former, the accusation might be renewed by the same prosecutor, but in the latter it was extinguished for ever. Within 30 days after a public *abolition*, the same accuser, with the prince's licence, was allowed to renew the charge; after a private *abolition*, another accuser might renew it, but the same could not. *Abolition* was also used for expunging a person's name from the public list of the accused, hung up in the treasury. It was either public, as that under Augustus, when all the names which had long hung up were expunged at once; or private, when it was done at the motion of one of the parties.

ABOLLA, in antiquity, a warm kind of garment, lined or doubled, worn by the Greeks and Romans, chiefly out of the city, in following the camp. Critics and antiquaries are greatly divided as to the form, use, kinds, &c. of this garment. Papias makes it a species of the *toga*, or gown; but Nonnius, and most others, suppose it to be a species of the *pallium*, or cloak. The *abolla* seems rather to have stood opposed to the *toga*, which was a garment of peace, as the *abolla* was of war; at least Varro and Martial place them in this opposite light. There seem to have been different kinds of *abollæ*, appropriated to different characters and occasions. Even kings appear to have used the *abolla:* Caligula was offended with King Ptolemy for appearing at the shows in a purple *abolla*, the splendour of which drew the eyes of the spectators from the emperor to himself.

ABON, Abona, or Abonis, in *Ancient Geography*, a town and river of Albion. The town, according to Camden, is Abingdon; and the river, Abhon or Avon. Others take the town to be Porshut, at the mouth of the river Avon, near Bristol. Abuin or Avon, in the Celtic language, denotes a river.

ABORAS, in *Ancient Geography*, by Xenophon called Araxes, a river of Mesopotamia, which flows into the Euphrates at Circesium. In the negotiation between Dioclesian and Narses, near the end of the third century, it was fixed as the boundary between the Roman and Persian empires.

ABORIGINES, in *History*, originally a proper name, given to a certain people in Italy, who inhabited the ancient Latium, or country now called *Campagna di Roma.* Whence this people came by the appellation is much disputed. St Jerome says, they were so called, as being *absque origine*, the primitive planters of the country after the flood: Dionysius of Halicarnassus accounts for the name, as denoting them the founders of the race of inhabitants of that country: others think them so called as being originally Arcadians, who claimed to be earth-born, and not descended from any people. The term *Aborigines*, in modern geography, is applied to the primitive inhabitants of a country, in contradistinction to colonies, or new races of people.

ABORTION, in *Midwifery*, the premature exclusion of a fœtus. It has sometimes been doubted whether this unnatural practice was ranked as a crime in the laws of Greece and Rome. This question has been revived, and elaborately discussed in France, by some members of the Institute. The subject, it seems, had been incidentally alluded to in a discourse of Gregoire's upon the influence of Christianity on the condition of the female sex, read in the early part of 1814. This produced two dissertations, one by M. Clavier, and the other by M. Boissonade; the first maintaining the impunity of the practice among the ancients, the last, that it was on the contrary viewed as a penal offence.

We find, says M. Clavier, that in one of Plato's dialogues (*Theæt.*) Socrates is made to speak of artificial abortion, as a practice not only common, but allowable; and Plato himself authorizes it in his *Republic*, (lib. v.) Aristotle (*Polit.* lib. vii. c. 17) gives it as his opinion, that no child ought to be suffered to come into the world, the mother being above forty, or the father above fifty-five years of age. Lysias maintained, in one of his pleadings quoted by Harpocration, that forced abortion could not be considered homicide, because a child *in utero* was not an animal, or separate existence. M. Clavier admits, that, in a treatise ascribed to Galen, (*An animal sit quod in utero est?*) there is mention made of enactments by Solon and Lycurgus against this crime; but he maintains that this is a spurious production, and that, at any rate, his testimony cannot be opposed to that of so many writers who lived long before his age. Among the Romans, Ovid (*Amor.* lib. ii.), Juvenal (*Sat.* vi. v. 594), and Seneca (*Consol. ad Helv.* 16), though they lament in strong terms the frequency of this enormity, yet they never allude to any laws by which it might be suppressed. Various other writers, it is said, preserve the same silence on this point, whilst joining in general reprobation of the crime.

On the other hand, M. Boissonade appeals not only to the authority of Galen, but of Cicero, (*Pro Cluentio*,) as placing it beyond a doubt, that, so far from being allowed to pass with impunity, the offence in question was sometimes punished with death. With regard to the authority of Lysias, he states, that the pleading referred to is quoted by Harpocration himself as of dubious authenticity; and, as to Plato and Aristotle, he observes, that their speculative reasonings, in matters of legislation, ought not to be confounded with the actual state of the laws. And he adds, that Stobæus (*Serm.* 73) has preserved a passage from Musonius, in which that philosopher expressly states, that the ancient lawgivers inflicted punishments on females who caused themselves to abort.

It seems indeed difficult to believe, that the practice in question should have been allowed to prevail without being denounced as criminal by the lawgivers of Greece and Rome; but it is not so clear that there was any law which punished it with death. Those readers who have any curiosity to enter more deeply into the inquiry, will be enabled to do so by consulting the various authorities to which M. Clavier and M. Boissonade have appealed, in support of their respective views of the question. The notorious frequency of the practice forms an odious feature in the manners of ancient times. Seneca makes it a ground of distinction for Helvia, that she had never, like others of her countrywomen, destroyed the child in her womb, in order to preserve her shape.

By the law of England till lately, the only party held to be guilty of murder in forcing abortion was the woman, when she was proved to have taken means to destroy a child *quick* in the womb, and actually to have thereby destroyed it. But in 1803, an act was passed, inflicting the punishment of death upon *all* concerned in *administering* any noxious substance with the *intent* to procure the miscarriage of any woman *quick* with child. The procuring or attempting it before the child has quickened, is punishable only with imprisonment or transportation. This law is evidently grounded upon a false hypothesis, that the fœtus is not quick or alive till its motion in the womb becomes perceptible to the mother; and, what is of more importance, it makes no provision against the attempt to procure abortion by *manual* application. The reader will find a curious illustration of this defect, in a trial which occurred at the assizes held at Bury St Edmunds in 1808. See *Trial of William Pizzy*, &c. Ipswich, 1808.

The case of John Fenton, tried at Perth in 1763, was the first instance of a criminal prosecution for this offence in Scotland; and here the public prosecutor restricted the libel to an arbitrary punishment. Our writers indeed agree, that, by the law of Scotland, the forcing of abortion is not homicide, whether the child be quick or not, except where the mother is killed in the process. Imprisonment or transportation may, and is all that can, in any case, be inflicted.

ABORTIVE Vellum, is made of the skin of an abortive or immature calf.

ABOUKIR, a small town of Egypt, with a castle and a little island adjoining, with which it is connected by a chain of rocks. It stands at the eastern extremity of the long neck of land between the sea and the lakes Mareotis and Maadie, upon which Alexandria, about twelve miles to the westward, is also situated. Eastward lies the spacious bay of Aboukir, reaching to the mouth of the Nile. This vicinity was the scene of some of the greatest events which distinguished the late war between Britain and France. In the bay of Aboukir, Nelson found the French fleet which had conveyed Buonaparte to Egypt, and instantly penetrating its line, gained that signal victory usually called the "Battle of the Nile," in which the whole of the enemy's fleet, with the exception of two vessels, were destroyed or captured. It was at Aboukir also that Sir Ralph Abercromby, in 1801, effected his landing, and having driven the enemy up the sand hills, took possession of the place. In other respects Aboukir is not of much importance.

ABOULFEDA, or ABULFEDA, the most celebrated of the Arabian writers on history and geography. Among his contemporaries he was also distinguished both as a ruler and a warrior. His descent was in a direct line from Ayoub, father to Saladin, and from whom the house of that conqueror received the appellation of Ayoubites. Omar, the grandson of Ayoub, was one of Saladin's most distinguished generals, and enjoyed the privilege, which he transmitted to his posterity, of being placed always on the right of the army. In reward of his services, he was created Prince of Hamah, the ancient Apamea, which, with some territories adjoining, became hereditary in his family. They were transmitted, in the course of succession, to Mahommed Mahmoud, and to Mahommed, the uncle of Aboulfeda. Although none of these princes equalled the military glory of Omar, they were yet distinguished both in arms and letters. Continually engaged in military expeditions, their court was at the same time open to learned men. It is mentioned, among the proofs of their zeal for science, that Mahmoud caused to be constructed at Hamah, a gilded sphere of great magnitude, on which all the stars then known were represented.

Aboulfeda was son to Ally, the brother of Mahommed. He was born at Damascus in the year 672 of the Hegira, (1273 A. D.) His early years were spent in the study of the Koran and of the sciences. By the age of twelve, however, he was summoned to the field, and was present at the attack of Marcab, a castle belonging to the knights of St John. Syria was then shaken by continual war, and thus scarcely a year elapsed, in which the young prince was not called out upon some military expedition. He successively assisted at the sieges of Tripoli, Acre, and Roum. In 1298, Prince Mahmoud, his cousin, who held the sovereignty, died, and left Aboulfeda heir. The succession, however, being violently disputed by his two brothers, the court, in consequence of their dissensions, took occasion to supersede all the three; and the Ayoubites lost the principality which they had enjoyed for more than a century. Aboulfeda, however, by his valour and other eminent qualities, soon recommended himself to the favour of the Sultan Melik-el-Nassir. He was present, and took an active part in the victory gained at Alkoroum in 1302, and in the still more signal one near Damascus in 1303, by which Syria was for the time delivered from the incursions of the Tartars. But peace was soon followed by internal dissensions. The throne of Egypt was disputed with Melik-el-Nassir by Bibars, who at first succeeded in obtaining possession of it. His rival, however, being supported by the great men of Syria, among whom Aboulfeda took a conspicuous part, finally triumphed. Aboulfeda, who had always stood well with Melik-el-Nassir, rose then into peculiar favour. The sultan took the first opportunity of establishing him in his patrimonial dignity of Prince of Hamah. Honours continued to shower upon him; he was invested with the distinctive marks of sovereignty, which consisted in the power of coining money, and in having prayers said in his name. The epithet *Melik Mowayyad*, victorious Prince, was conferred upon him; and it is stated by an Arabian author, that the sultan, in writing, addressed him by the appellation of brother.

The rest of Aboulfeda's life was spent in splendour and tranquillity, devoted to the government of his territory, and to the pursuits of science. Besides cultivating, he patronised literature; and his court became the rendezvous of all the learned men of the East. He conversed with them familiarly, bestowed upon them honours and pensions, and being himself superior to all in learning, felt no jealousy of their acquirements. During the same period he composed the works which have transmitted his name to posterity. In this enviable manner he spent the period of twenty years, when an illness, of which the particulars are not related, carried him off on the 26th October 1331. He was succeeded by his son Melik-el-Afdhal, of whom little is recorded, and who was the last Prince of Hamah.

The two works by which Aboulfeda is known in Europe, are his *Geography* and his *History*. The former ranks at least equal to any composed upon that subject by the Arabian writers. It partakes indeed of their general defects; for, although he seems to have paid more attention to the latitudes and longitudes than the rest of his countrymen, yet the imperfect application of astronomy, and the obscurity of his notation, have much diminished the value of this part of his labours. It is chiefly in the historical and descriptive parts that he can now be regarded as an authority. Here too his knowledge, as he himself candidly confesses, is chiefly confined to the circle of Moslem dominion; but within those limits, the information conveyed by him is undoubtedly valuable.

His *History* possesses still higher claims to distinction. His method, as was usual with his countrymen, is entirely that of annals, and is in many parts too much abridged; but the work contains much valuable information with regard to the Saracen, and even to the Greek empire. It is divided into five parts, beginning at the creation of the world, and ending with the year 1328.

There are copies of his *Geography* in manuscript in the national library of France, in that of the university of Leyden, and in the Bodleian. It has hitherto been published only in fragments, of which the following are the principal. *Chorasmia et Mawaralnahra* a Joan. Gravio, Londini; reprinted along with *Arabia*, in Hudson's *Geographi Græci Minores*, Oxford, 1698–1712.—*Tabula Syri*, Arab. et Lat. by Koehler and Reiske, 4to. Leipsic, 1766.—*Descriptio Ægypti*, Arab. et Lat. Michaelis, Gotting. 8vo. 1776.—*Africa, Arab. cum notis J. G. Eichhorn*, Gotting. 1791.—*Arabia cum commentario*, Chr. Rommel, Gotting. 4to. 1801. Complete editions were undertaken by Bishop Hyde, by D'Arvieux in conjunction with Thevenot, and by Gagnier, the translator of the life of Mahomet; but different circumstances prevented their execution.

The *History* of Aboulfeda is also found in manuscript in the French, Bodleian, and Escurial libraries. A great part of the copy preserved in the first is believed to be autograph. This work has been published only in fragments. *Life of Mahomet*, Arab. et Lat. Gagnier, fol. Oxoniæ, 1723. *Annales Moslemici*, Lat. Reiske, Lipsiæ, 1754.—*Annales Moslemici*, sumptibus P. F. Suhmii, 5 tom. 4to. Hafniæ, 1789–94. Suhm was historiographer and chamberlain to the King of Denmark. The edition is excellent, and enriched with notes by Reiske.

See *Notice Historique sur Abulfeda et ses Ouvrages*, par Am. Jourdain. Malte-Brun. *Annales des Voyages*, tom. xviii. (E.)

ABOUTIGE, a town of Upper Egypt, in Africa, near the Nile, where they made the best opium in all the Levant. It was formerly a large, but now is a mean place. N. Lat. 26. 50.

ABRA, a silver coin struck in Poland, and worth about one shilling sterling. It is current in several parts of Germany, at Constantinople, Astracan, Smyrna, and Grand Cairo.

ABRABANEL, ABARBANEL, or AVRAVANEL, ISAAC, a celebrated rabbi, descended from King David, and born at Lisbon A. D. 1437. He became counsellor to Alphonso V. king of Portugal, and afterwards to Ferdinand the Catholic; but in 1492 was obliged to leave Spain with the other Jews. In short, after residing at Naples, Corfu, and several other cities, he died at Venice in 1508, aged 71. Abrabanel passed for one of the most learned of the rabbis; and the Jews gave him the names of the Sage, the Prince, and the Great Politician. We have a commentary of his on all the Old Testament, which is pretty scarce: he there principally adheres to the literal sense; and his style is clear, but a little diffuse. His other works are, A Treatise on the Creation of the World; in which he refutes Aristotle, who imagined that the world was eternal: A Treatise on the Explication of the Prophecies relating to the Messiah, against the Christians: A book concerning Articles of Faith; and some others less sought after. Though Abrabanel discovers his implacable aversion to Christianity in all his writings, yet he treated Christians with politeness and good manners in the common affairs of life.

ABRACADABRA, a magical word, recommended by Serenus Samonicus as an antidote against agues and several other diseases. It was to be written upon a piece of paper as many times as the word contains letters, omitting the last letter of the former every time, as in the margin,[1] and repeated in the same order; and then suspended about the neck by a linen thread. *Abracadabra* was the name of a god worshipped by the Syrians, the wearing of whose name was a sort of invocation of his aid.

ABRAHAM, the father and stock whence the faithful sprung, was the son of Terah. He was descended from Noah by Shem, from whom he was nine degrees removed. Some fix his birth in the 130th year of Terah's age, but others place it in his father's 70th year. It is highly probable he was born in the city of Ur, in Chaldea, which he and his father left when they went to Canaan, where they remained till the death of Terah; after which, Abraham resumed his first design of going to Palestine. The Scriptures mention the several places he stopped at in Canaan; his journey into Egypt, where his wife was carried off from him; his going into Gerar, where Sarah was again taken from him, but restored as before; the victory he obtained over the four kings who had plundered Sodom; his compliance with his wife, who insisted that he should make use of their maid Hagar in order to raise up children; the covenant God made with him, sealed with the ceremony of circumcision; his obedience to the command of God, who ordered him to offer up his only son as a sacrifice, and how this bloody act was prevented; his marriage with Keturah; his death at the age of 175 years; and his interment in the cave of Machpelah, near the body of Sarah his first wife.

Abraham is said to have been well skilled in many sciences, and to have written several books. Josephus[2] tells us that he taught the Egyptians arithmetic and geometry; and according to Eupolemus and Artapan, he instructed the Phœnicians, as well as the Egyptians, in astronomy. A work which treats of the creation has been long ascribed to him: it is mentioned in the Talmud,[3] and the rabbis Chanina and Hoschia used to read it on the eve before the Sabbath. In the first ages of Christianity, according to St Epiphanius,[4] an heretical sect, called *Sethinians*, dispersed a piece which had the title of *Abraham's Revelation*. Origen mentions also a treatise supposed to have been written by this patriarch. The book on the creation was printed at Paris in 1552, and translated into Latin by Postel: Rittangel, a converted Jew, and professor at Königsberg, gave also a Latin translation of it, with remarks, in 1642.

ABRAHAM, *Ben Chaila*, a Spanish rabbi, in the 13th century, who professed astrology, and assumed the character of a prophet. He pretended to predict the coming of the Messiah, which was to happen in the year 1358; but fortunately he died in 1303, fifty-five years before the time when the prediction was to be fulfilled. He wrote a book, *De Nativitatibus*, which was printed at Rome in 1545.

ABRAHAM USQUE, a Portuguese Jew, who, in conjunction with Tobias Athias, translated the Hebrew Bible into Spanish. It was printed at Ferrara in 1553, and reprinted in Holland in 1630. This Bible, especially the first edition, which is most valuable, is marked with stars at certain words, which are designed to show that these words are difficult to be understood in the Hebrew, and that they may be used in a different sense.

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[2] *Antiq.* lib. i. cap. 7, 8.

[3] Heidegger, *Hist. Patriarch.* tom. ii. p. 143.

[4] *Advers. Hær.* p. 286.

ABRAHAM, or ABRAM, *Nicholas*, a learned Jesuit, born in the diocese of Toul, in Lorrain, in 1589. He obtained the rank of divinity professor in the university of Pont-a-Mouson, which he enjoyed 17 years, and died September 7. 1655. He wrote Notes on Virgil and on Nonnius; A Commentary on some of Cicero's Orations, in two vols. folio; an excellent collection of theological pieces in folio, entitled *Pharus Veteris Testamenti*; and a Hebrew Grammar in verse.

ABRAHAMITES, an order of monks exterminated for idolatry by Theophilus in the ninth century. Also the name of another sect of heretics who had adopted the errors of Paulus.

ABRAHAMSDORF, or ABRAHAMSFALVA, a village in Hungary, in the circle of hither Theiss, one of sixteen which were formerly part of Poland, but in 1772 united with Hungary, in consequence of which they all enjoy some peculiar rights of exemption from the Austrian taxes and judicatories.

ABRANTES, a town of Portugal, in the province of Estremadura. It is situated on the Tagus, near its junction with the Zezare, which is navigable for barges. The situation is delightful, on the upper part of a sloping hill, with a country below it covered with olive trees, and interspersed with vineyards. One of Buonaparte's generals had the title of duke of this place conferred on him. It has 4 monasteries, 1 hospital, 1 poor-house, and 3500 inhabitants. Its trade with Lisbon employs 100 boats.

ABRASAX, or ABRAXAS, the supreme god of the Basilidian heretics. It is a mystical or cabbalistic word, composed of the Greek letters α, ϐ, ϱ, α, ξ, α, ς, which together, according to the Grecian mode of numeration, make up the number 365. For Basilides taught, that there were 365 heavens between the earth and the empyrean; each of which heavens had its angel or intelligence, which created it; each of which angels likewise was created by the angel next above it; thus ascending by a scale to the Supreme Being, or first Creator. The Basilidians used the word *Abraxas* by way of charm or amulet.

ABRASION is sometimes used among medical writers for the effect of sharp corrosive medicines or humours in wearing away the natural mucus which covers the membranes, and particularly those of the stomach and intestines. The word is composed of the Latin *ab* and *rado*, *to shave* or *scrape off*.

ABRAVANNUS, in *Ancient Geography*, the name of a promontory and river of Galloway in Scotland, so called from the Celtic term *Aber*, signifying either the mouth of a river or the confluence of two rivers, and *Avon*, a river.

ABRAUM, in *Natural History*, a name given by some writers to a species of red clay, used in England by the cabinet-makers, &c. to give a red colour to new mahogany wood. We have it from the Isle of Wight; but it is also found in Germany and Italy.

ABRAXAS, an antique stone with the word *abraxas* engraven on it. They are of various sizes, and most of them as old as the third century. They are frequent in the cabinets of the curious; and a collection of them, as complete as possible, has been desired by several. There is a fine one in the abbey of St Genevieve, which has occasioned much speculation. Most of them seem to have come from Egypt; whence they are of some use for explaining the antiquities of that country. Sometimes they have no other inscription besides the word: but others have the names of saints, angels, or Jehovah himself annexed; though most usually the name of the Basilidian god. Sometimes there is a representation of Isis sitting on a lotus, or Apis surrounded with stars; sometimes monstrous compositions of animals, obscene images, Phalli and Ithyphalli. The engraving is rarely good, but the word on the reverse is sometimes said to be in a more modern style than the other. The characters are usually Greek, Hebrew, Coptic, or Hetrurian, and sometimes of a mongrel kind, invented, as it would seem, to render their meaning the more inscrutable. It is disputed whether the Veronica of Montreuil, or the granite obelisk mentioned by Gori, be *Abraxases*.

ABREAST (a sea term), side by side, or opposite to; a situation in which two or more ships lie, with their sides parallel to each other, and their heads equally advanced. This term more particularly regards the line of battle at sea, where on the different occasions of attack, retreat, or pursuit, the several squadrons or divisions of a fleet are obliged to vary their dispositions, and yet maintain a proper regularity by sailing in right or curved lines. When the line is formed abreast, the whole squadron advances uniformly, the ships being equally distant from and parallel to each other, so that the length of each ship forms a right angle with the extent of the squadron or line abreast. The commander-in-chief is always stationed in the centre, and the second and third in command in the centres of their respective squadrons.—*Abreast*, within the ship, implies on a line with the beam, or by the side of any object aboard; as, the frigate sprung a leak *abreast* of the main hatchway, *i. e.* on the same line with the main hatchway, crossing the ship's length at right angles, in opposition to AFORE or ABAFT the hatchway.

ABRIDGEMENT, in *Literature*, a term signifying the reduction of a book into a smaller compass.

"The mode of reducing," says the author of the *Curiosities of Literature*, "what the ancients had written in bulky volumes, practised in preceding centuries, came into general use about the fifth. As the number of students and readers diminished, authors neglected literature, and were disgusted with composition; for to write is seldom done, but when the writer entertains the hope of finding readers. Instead of original authors, there suddenly arose numbers of *abridgers*. These men, amidst the prevailing disgust for literature, imagined they should gratify the public by introducing a mode of reading works in a few hours, which otherwise could not be done in many months; and observing that the bulky volumes of the ancients lay buried in dust, without any one condescending to examine them, the disagreeable necessity inspired them with an invention that might bring those works and themselves into public notice, by the care they took of renovating them. This they imagined to effect by forming abridgements of these ponderous volumes.

"All these Abridgers, however, did not follow the same mode. Some contented themselves with making a mere abridgement of their authors, by employing their own expressions, or by inconsiderable alterations. Others composed those abridgements in drawing them from various authors, but from whose works they only took what appeared to them most worthy of observation, and dressed them in their own style. Others, again, having before them several authors who wrote on the same subject, took passages from each, united them, and thus formed a new work. They executed their design by digesting in common-places, and under various titles, the most valuable parts they could collect, from the best authors they read. To these last ingenious scholars we owe the rescue of many valuable fragments of antiquity. They happily preserved the best maxims, the characters of persons, descriptions, and many other subjects which they found interesting in their studies.

"There have been learned men who have censured these Abridgers, as the cause of our having lost so many excellent entire works of the ancients; for posterity becoming less studious, was satisfied with these extracts, and neglected to preserve the originals, whose voluminous size was less attractive. Others on the contrary say, that these Abridgers have not been so prejudicial to literature as some have imagined; and that had it not been for their care, which snatched many a perishable fragment from that shipwreck of letters which the barbarians occasioned, we should perhaps have had no works of the ancients remaining.

"Abridgers, Compilers, and even Translators, in the present fastidious age, are alike regarded with contempt; yet to form their works with skill requires an exertion of judgment, and frequently of taste, of which their contemners appear to have no conception. It is the great misfortune of such literary labours, that even when performed with ability, the learned will not be found to want them, and the unlearned have not discernment to appreciate them." (D'Israeli's *Curiosities of Literature.*)

ABRIES, a town in France, in the department of the Upper Alps, and arrondissement of Briançon. It was formerly a portion of Savoy. Inhabitants 2030.

ABROGATION, the act of abolishing a law, by authority of the maker; in which sense the word is synonymous with abolition, repealing, and revocation.

Abrogation stands opposed to *rogation:* it is distinguished from *derogation*, which implies the taking away only some part of a law; from *subrogation*, which denotes the adding a clause to it; from *obrogation*, which implies the limiting or restraining it; from *dispensation*, which only sets it aside in a particular instance; and from *antiquation*, which is the refusing to pass a law.

ABROKANI, or Mallemolli, a kind of muslin, or clear, white, fine cotton cloth, brought from the East Indies, particularly from Bengal.

ABROTONUM, in *Ancient Geography*, a town and harbour on the Mediterranean, one of the three cities that formed Tripoli.

ABRUCENA, a town on the district of Guadix, in the province of Granada, in Spain, between the Sierra Nevada and Jaen.

ABRUD-BANYA, a town of Hungary, in the province of Magyoren, in the circle of Weissenburg. It is situated on the river Ampoy, has one Reformed and one Greek church, is the seat of a board of mining, and in its vicinity mines of gold and of silver are wrought. It is in Lat. 46. 14. 9. N. and Long. 23. 49. 3. E.

ABRUS, in *Botany*, the trivial name of the Glycine.

ABRUZZO, one of the four provinces into which the continental part of the kingdom of Naples, or of the two Sicilies, was formerly divided, but now the name given to three out of the 17 provinces of the later division of that country. It is, with altered boundaries, now distinguished as Abruzzo Ulteriore First, Abruzzo Ulteriore Second, and Abruzzo Citeriore.

Abruzzo Ulteriore First, is a maritime province on the Adriatic Sea, which is its boundary towards the north-east. On the north-west the Papal dominions bound it, on the south-east Abruzzo Citeriore, and on the south-west Abruzzo Ulteriore Second. The western part of the province is very mountainous; the highest crest of the Appenines divides it from Abruzzo Ulteriore Second, and extends towards the sea. The district on the sea-coast is flat, but everywhere else hilly. The valleys between the hills possess a rich soil, well watered by rivulets and brooks in the winter and spring, but which are generally dried up in the summer months. These streams either run into the Pescara, which bounds the province towards Abruzzo Citeriore, or into the Tronto, which is the boundary on the Papal frontier. The extent of the province is 1140 square miles, or 730,600 English acres. The cultivation is badly conducted, and many districts are almost left in a state of natural wildness. The art of irrigation is not understood, nor embankment of the rivers practised, so that the best of the land is often rendered useless. There are owners of two or three hundred acres of land, who scarcely raise sufficient food for their families; and yet the soil, when tolerably managed, will yield 12 grains of wheat for one. The corn most cultivated and preferred is maize. Hemp and flax are raised, but, like corn, merely sufficient for the home supply. Olives, almonds, figs, grapes, and chesnuts, are abundant, as is wood for construction and fuel. The number of inhabitants is 157,339, according to the late census. They are a hardy, bold, idle, and superstitious race. The most industrious of them stroll yearly into the territories of the Church to work at harvest and in making charcoal, and return home in winter with their wages. The province is divided into two districts, Teramo and Civita di Penne. The city of Teramo is the capital of the province.

Abruzzo Ulteriore Second, a province in the continental division of the kingdom of Naples. It is an inland district, bounded on the north by the Papal States, on the north-east by Abruzzo Ulteriore First, on the south-east by Abruzzo Citeriore, on the south by the province Terra di Lavora, and on the west by the States of the Church. The extent is 2210 square miles, or 1,414,400 acres. The whole province is nearly covered with mountains of various heights, one of which, the Grand Casso d'Italia, near Aquila, is the loftiest peak of the Appenines. There are no plains; but among these mountains some beautiful and fruitful valleys have been formed by the various streams that run through them. None of the rivers are navigable, but all of them have abundance of water, except in the hottest of the summer months. The largest fresh lake of the kingdom is that of Cellano, 14 miles long, and 9 broad, surrounded with hills. A canal, built by the Romans to carry off the surplus water, has been long neglected and stopped up, but is now in course of being cleaned and opened. The air is generally temperate, and the sirocco is never felt. The cultivation just suffices to provide sufficient corn for the inhabitants, who, when the maize is dear, make out their subsistence by the help of chesnuts. Olives and vines rarely bring their fruit to full ripeness. Some flax and hemp are raised, and a vast quantity of saffron, which is generally preferred to all other. The sheep produce fine wool when the flocks migrate, and the flesh is good. The cows yield good butter and cheese, which form the chief articles of exportation to the neighbouring provinces. The inhabitants amount to 249,600. Like all mountaineers, they are a strong and active race, and frugal in their habits. The manufactures are insignificant, consisting of some little woollen and linen cloth, some paper, pottery, and wood-ware; but not sufficient of any for the demand of the territory, which is supplied by the exchange of almonds, figs, saffron, wool, butter, and cheese. The chief city is Aquila.

Abruzzo Citeriore, a province in the kingdom of Naples. It is bounded on the north-west by Abruzzo Ulteriore First, on the north-east by the Adriatic Sea, on the south-west by the province Molise, and on the west by that of Abruzzo Ulteriore Second. This province is less hilly than the other two Abruzzos, but the Appenines are extended through the south-west part. They, however, gradually decline in height, and extend themselves in wide plains of sand and pebbles. The rivers all run to the Adriatic, and are very deficient in water during the summer months. Agriculture is in a very backward state, and the soil is rather ungrateful when labour is bestowed upon it; and the inhabitants prefer the chase and the fishery to it. The corn is sufficient for the population, who grow and consume much more maize and rice than wheat or barley. On the coast some oil and some silk are produced, which, with wine, form the chief export articles. Hemp, flax, liquorice, almonds, and figs, are grown for home consumption. The cattle are more neglected than in the other Abruzzos, though there is excellent pasture both for sheep and cows. There are, however, abundance of swine, goats, and asses. The manufactures are very insignificant. All the exchange of commodities is carried on by land; for though the province has an extensive frontier to the sea, it has no harbour or secure anchoring places. The extent is 1920 square miles, or 1,228,800 acres. The inhabitants are 222,730. There is but one decent road through the province. The capital is Civita di Chieti, formerly called Teti.

ABSALOM, in *Scripture History*, the son of David by Maacah, was brother to Tamar, David's daughter, who was ravished by Amnon, their eldest brother by another mother. Absalom waited two years for an opportunity of revenging the injury done to his sister; and at last procured the assassination of Amnon at a feast which he had prepared for the king's sons. He took refuge with Talmai, king of Geshur; and was no sooner restored to favour than he engaged the Israelites to revolt from his father. Absalom was defeated in the wood of Ephraim: as he was flying, his hair caught hold of an oak, where he hung till Joab came and thrust him through with three darts. David had expressly ordered his life to be spared, and extremely lamented him. The weight of Absalom's hair, which is stated at "200 shekels after the king's weight," has occasioned much critical discussion. If, according to some, the Jewish shekel of silver was equal to half an ounce avoirdupois, 200 shekels would be 6¼ pounds; or, according to Josephus, if the 200 shekels be equal to 5 minæ, and each mina 2½ pounds, the weight of the hair would be 12½ pounds, a supposition not very credible. It has been supposed by others, that the shekel here denotes a weight in gold equal to the value of the silver shekel, or half an ounce, which will reduce the weight of the hair to about 5 ounces; or that the 200 shekels are meant to express the value, not the weight.

ABSCESS, in *Surgery*; from *abscedo*, to separate; a cavity containing *pus*, or a collection of puriform matter in a part: So called, because the parts which were joined are now separated; one part recedes from another, to make way for the collected matter.

ABSCISSE, in *Conics*, a part of the diameter or transverse axis of a conic section, intercepted between the vertex or some other fixed point and a semiordinate. See Conic Sections.

ABSCONSA, a dark lantern used by the monks at the ceremony of burying their dead.

ABSENTEE. See Ireland.

ABSIMARUS, in *History*, having dethroned Leontius, cut off his nose and ears, and shut him up in a monastery, was proclaimed by the soldiers emperor of the East, A. D. 698. Leontius himself was also an usurper. He had dethroned Justinian II. who afterwards, with the assistance of the Bulgarians, surprised and took Constantinople, and made Absimarus prisoner. Justinian, now settled on the throne, and having both Absimarus and Leontius in his power, loaded them with chains, ordered them to lie down on the ground, and with a barbarous pleasure held a foot on the neck of each for the space of an hour in presence of the people. They were beheaded A. D. 705.

ABSINTHIATED, any thing tinged or impregnated with absinthium or wormwood. Bartholin mentions a woman whose milk was become absinthiated, and rendered as bitter as gall, by the too liberal use of wormwood.

Vinum absinthites, or *poculum absinthiatum*, "wormwood wine," is much spoken of among the ancients as a wholesome drink, and even an antidote against drunkenness. Its medical virtues depend on its aromatic and bitter qualities. Infused in wine or spirits, it may prove beneficial in cases of indigestion or debility of the stomach.

ABSINTHIUM, in *Botany*, the trivial name of the common wormwood.

ABSOLUTE, in a general sense, something that stands free or independent.

Absolute is more particularly understood of a being or thing which does not proceed from any cause, or does not subsist by virtue of any other being, considered as its cause; in which sense God alone is *absolute*. *Absolute*, in this sense, is synonymous with *independent*, and stands opposed to *dependent*.

Absolute also denotes a thing that is free from conditions or limitations; in which sense the word is synonymous with *unconditional*. We say, an *absolute* decree, *absolute* promise, *absolute* obedience.

Absolute Government, that in which the prince is left solely to his own will, being not limited to the observance of any laws except those of his own discretion.

Absolute Equations, in *Astronomy*, is the aggregate of the optic and eccentric equations. The apparent inequality of a planet's motion, arising from its not being equally distant from the earth at all times, is called its optic equation, and would subsist even if the planet's real motion were uniform. The eccentric inequality is caused by the planet's motion being uniform. To illustrate which, conceive the sun to move, or to appear to move, in the circumference of a circle, in whose centre the earth is placed. It is manifest, that if the sun moves uniformly in this circle, it must appear to move uniformly to a spectator on the earth; and in this case there will be no optic nor eccentric equation: but suppose the earth to be placed out of the centre of the circle, and then, though the sun's motion should be really uniform, it would not appear to be so, when seen from the earth; and in this case there would be an optic equation, without an eccentric one. Imagine further, the sun's orbit to be not circular but elliptic, and the earth in its focus; it will be as evident that the sun cannot appear to have an uniform motion in such ellipse: so that his motion will then be subject to two equations, the optic and the eccentric.

Absolute Number, in *Algebra*, is any pure number standing in any equation without the conjunction of literal characters; as $2x + 36 = 48$; where 36 and 48 are absolute numbers, but 2 is not, as being joined with the letter x.

ABSOLUTION, in *Civil Law*, is a sentence whereby the party accused is declared innocent of the crime laid to his charge.

Absolution, in the *Canon Law*, is a juridical act, whereby the priest declares the sins of such as are penitent remitted.—The Romanists hold absolution a part of the sacrament of penance; the council of Trent, sess. xiv. cap. iii. and that of Florence, in the decree *ad Armenos*, declare the form or essence of the sacrament to lie in the words of *absolution*, "I absolve thee of thy sins." The *formula* of absolution, in the Roman church, is absolute; in the Greek church, it is deprecatory; and in the churches of the Reformed, declarative.

Absolution is chiefly used among Protestants for a sentence by which a person who stands excommunicated is released or freed from that punishment.

ABSORBENT, in general, any thing possessing the faculty of *absorbing*, or swallowing up another.

Absorbent Medicines, testaceous powders, or substances into which calcareous earth enters, as chalk, crabs eyes, &c. which are taken inwardly, for drying up or absorbing any acid or redundant humours in the stomach or intestines. They are likewise applied externally to ulcers or sores with the same intention.

Absorbents, or *Absorbing Vessels*, in *Anatomy*, a name given promiscuously to the lacteal vessels, lymphatics, and inhalant arteries; a minute kind of vessels found in animal bodies, which imbibe fluids that come in contact with them. On account of their minuteness and transparency, they escape observation in ordinary dissection. They have, however, been detected in every tribe of animals, and, in the animals which have been examined, in every part of the body.

ABSORPTION, in the animal economy, is the function of the absorbent vessels, or that power by which they take up and propel substances. This power has been ascribed to the operation of different causes, according to the theories which physiologists have proposed. Some attribute it to capillary attraction, others to the pressure of the atmosphere, and others to an ambiguous or unknown cause, which they denominate *suction*; for this last is nothing else than the elastic power of one part of the air restoring the equilibrium, which has been destroyed by the removal or rarefaction of another part.

Absorptions of the Earth, a term used by Kircher and others for the sinking in of large tracts of land by means of subterranean commotions, and many other accidents.

Pliny tells us, that in his time the mountain Cybotus, with the town of Curites, which stood on its side, were wholly absorbed into the earth, so that not the least trace of either remained; and he records the like fate of the city of Tantalis in Magnesia, and after it of the mountain Sipylus, both thus absorbed by a violent opening of the earth. Galanis and Gamales, towns once famous in Phœnicia, are recorded to have met the same fate; and the vast promontory called *Phegium*, in Ethiopia, after a violent earthquake in the night-time, was not to be seen in the morning, the whole having disappeared, and the earth closed over it. These and many other histories, attested by the authors of greatest credit among the ancients, abundantly prove the fact in the earlier ages; and there have not been wanting too many instances of more modern date. (Kircher's *Mund. Subter.* p. 77.)

Picus, a lofty mountain in one of the Molucca isles, which was seen at a great distance, and served as a landmark to sailors, was entirely destroyed by an earthquake; and its place is now occupied by a lake, the shores of which correspond exactly to the base of the mountain. In 1556, a similar accident happened in China. A whole province of the mountainous part of the country, with all the inhabitants, sunk in a moment, and was totally swallowed up: the space which was formerly land was also covered with an extensive lake of water. And, during the earthquakes which prevailed in the kingdom of Chili, in the year 1646, several whole mountains of the Andes sunk and disappeared.

ABSORUS, Apsorus, Absyrtis, Absyrtides, (Strabo, Mela, Ptolemy); islands in the Adriatic, in the gulf of Carnero; said to be so called from Absyrtus, Medea's brother, there slain. They are now called *Cherso* and *Osero*.

ABSTEMII, in church history, a name given to such persons as could not partake of the cup of the eucharist on account of their natural aversion to wine. Calvinists allow these to communicate in the species or bread only, touching the cup with their lip; which, on the other hand, is by the Lutherans deemed a profanation.

ABSTERGENT Medicines, those employed for resolving obstructions, concretions, &c. such as soap, &c.

ABSTINENCE, in a general sense, the act or habit of refraining from something to which there is a strong propensity. Among the Jews, various kinds of abstinence were ordained by their law. The Pythagoreans, when initiated, were enjoined to abstain from animal food, except the remains of sacrifices; and to drink nothing but water, unless in the evening, when they were permitted to take a small portion of wine. Among the primitive Christians, some denied themselves the use of such meats as were prohibited by that law, others regarded this abstinence with contempt; of which St Paul gives his opinion, Rom. xiv. 1–3. The council of Jerusalem, which was held by the apostles, enjoined the Christian converts to abstain from meats strangled, from blood, from fornication, and from idolatry. Abstinence, as prescribed by the gospel, is intended to mortify and restrain the passions, to humble our vicious natures, and by that means raise our minds to a due sense of devotion. But there is another sort of abstinence, which may be called *ritual*, and consists in abstaining from particular meats at certain times and seasons. It was the spiritual monarchy of the western world which first introduced this ritual abstinence, the rules of which were called *rogations*; but grossly abused from the true nature and design of fasting. In England, abstinence from flesh has been enjoined by statute since the Reformation, particularly on Fridays and Saturdays, on vigils, and on all commonly called *fish days*. The like injunctions were renewed under Queen Elizabeth; but at the same time it was declared that this was done, not out of motives of religion, as if there were any difference in meats, but in favour of the consumption of fish, and to multiply the number of fishermen and mariners, as well as to spare the stock of sheep. The great fast, says St Augustin, is to abstain from sin.

Abstinence is more particularly used for a spare diet, or a slender parsimonious use of food. Physicians relate wonders of the effects of abstinence in the cure of many disorders, and protracting the term of life. The noble Venetian Cornaro, after all imaginable means had proved vain, so that his life was despaired of at 40, recovered, and lived to near 100, by the mere effect of abstinence; as he himself gives the account. It is indeed surprising to what a great age the primitive Christians of the East, who retired from the persecutions into the deserts of Arabia and Egypt, lived, healthful and cheerful, on a very little food. Cassian assures us, that the common rate for 24 hours was 12 ounces of bread, and pure water: with such frugal fare St Anthony lived 105 years; James the Hermit, 104; Arsenius, tutor of the Emperor Arcadius, 120; St Epiphanius, 115; Simeon the Stylite, 112; and Romauld, 120. Indeed, we can match these instances of longevity at home. Buchanan informs us, that one Laurence arrived at the great age of 140 by force of temperance and labour; and Spotswood mentions one Kentigern, afterwards called St Mongah or Mungo, who lived to 185 by the same means. Abstinence, however, is to be recommended only as it means a proper regimen; for in general it must have bad consequences when observed without a due regard to constitution, age, strength, &c. According to Dr Cheyne, most of the chronical diseases, the infirmities of old age, and the short lives of Englishmen, are owing to repletion, and may be either cured, prevented, or remedied by abstinence; but then the kinds of abstinence which ought to be observed, either in sickness or health, are to be deduced from the laws of diet and regimen.

Among the inferior animals, we see extraordinary instances of long abstinence. The serpent kind, in particular, bear abstinence to a wonderful degree. We have seen rattle-snakes which had lived many months without any food, yet still retained their vigour and fierceness. Dr Shaw speaks of a couple of cerastes (a sort of Egyptian serpents), which had been kept five years in a bottle close corked, without any sort of food, unless a small quantity of sand in which they coiled themselves up in the bottom of the vessel may be reckoned as such; yet when he saw them, they had newly cast their skins, and were as brisk and lively as if just taken. But it is natural for divers species to pass four, five, or six months every year, without either eating or drinking. Accordingly, the tortoise, bear, dormouse, serpent, &c. are observed regularly to retire, at those seasons, to their respective cells, and hide themselves, some in the caverns of rocks or ruins; others dig holes under ground; others get into woods, and lay themselves up in the clefts of trees; others bury themselves under water, &c. And these animals are found as fat and fleshy, after some months' abstinence, as before.—Sir G. Ent[1] weighed his tortoise several years successively, at its going to earth in October, and coming out again in March; and found, that of four pounds four ounces, it only used to lose about one ounce.

We have instances of men passing several months as strictly abstinent as other creatures. In particular, the records of the Tower mention a Scotsman imprisoned for felony, and strictly watched in that fortress for six weeks, during which time he did not take the least sustenance; and on this account he obtained his pardon. Numberless instances of extraordinary abstinence, particularly from morbid causes, are to be found in the different periodical Memoirs, Transactions, Ephemerides, &c. It is to be added, that, in most instances of extraordinary abstinence related by naturalists, there were said to have been apparent marks of a texture of blood and humours, much like that of the animals above-mentioned. Though it is no improbable opinion that the air itself may furnish something for nutrition, it is certain there are substances of all kinds, animal, vegetable, &c. floating in the atmosphere, which must be continually taken in by respiration; and that an animal body may be nourished thereby, is evident in the instance of vipers; which, if taken when first brought forth, and kept from every thing but air, will yet grow very considerably in a few days. So the eggs of lizards are observed to increase in bulk after they are produced; and in like manner the eggs or spawn of fishes grow and are nourished with the water. And hence, say some, it is that cooks, turnspit dogs, &c. though they eat but little, yet are usually fat.

ABSTINENTS, or Abstinentes, a set of heretics that appeared in France and Spain about the end of the third century. They are supposed to have borrowed part of their opinions from the Gnostics and Manicheans, because they opposed marriage, condemned the use of flesh meat, and placed the Holy Ghost in the class of created beings. We have, however, no certain account of their peculiar tenets.

ABSTRACT, in a general sense, any thing separated from something else.

Abstract Ideas, in *Metaphysics*. See Abstraction.

Abstract Mathematics, otherwise called *Pure Mathematics*, is that which treats of magnitude or quantity, absolutely and generally considered, without restriction to any species of particular magnitude; such are Arithmetic and Geometry. In this sense, abstract mathematics is opposed to mixed mathematics; wherein simple and abstract properties, and the relations of quantities primitively considered in pure mathematics, are applied to sensible objects, and by that means become intermixed with physical considerations: such are Hydrostatics, Optics, Navigation, &c.

Abstract Numbers, are assemblages of units, considered in themselves, without denoting any particular and determinate things. Thus, six is an abstract number when not applied to any thing; but if we say 6 feet, 6 becomes a concrete number.

Abstract Terms, words that are used to express abstract ideas. Thus *beauty*, *ugliness*, *whiteness*, *roundness*, *life*, *death*, are abstract terms.

Abstract, in *Literature*, a compendious view of any large work; shorter and more superficial than an abridgement.

ABSTRACTION, in *Metaphysics*, is a term used to denote the mind's power of considering certain qualities or attributes of an object apart from the rest; or the power which the understanding has of separating the combinations which are presented to it.

Abstraction is chiefly employed in these three ways. First, When the mind considers any one part of a thing, in some respect distinct from the whole; as a man's arm, without the consideration of the rest of the body. Secondly, When we consider the *mode* of any substance, omitting the substance itself; or when we separately consider several modes which subsist together in one subject. This abstraction the geometricians make use of when they consider the length of a body separately, which they call *a line*, omitting the consideration of its breadth and thickness. Thirdly, It is by abstraction that the mind forms general ideas. Thus, when we would understand a thinking being in general, we gather from our self-consciousness what it is to think; and omitting those things which have a particular relation to our own minds, or to the human mind, we conceive a thinking being in general.

Ideas formed in this manner, which are what we properly call *abstract ideas*, become general representatives of all objects of the same kind. Thus the idea of colour that we receive from chalk, snow, milk, &c. is a representative of all of that kind; and has a name given it, *whiteness*, which signifies the same quality wherever found or imagined. See the article Metaphysics.

ABSURDUM, *reductio ad absurdum*, is a mode of demonstration employed by mathematicians when they prove the truth of a proposition by demonstrating that the contrary is impossible, or leads to an absurdity. It is in this manner that Euclid demonstrates the fourth proposition of the first book of the Elements, by showing that the contrary involves a manifest absurdity, viz. *That two straight lines can inclose a space.*

ABSYRTUS, in heathen mythology, the son of Æetes and Hypsea, and the brother of Medea. The latter running away with Jason, after her having assisted him in carrying off the golden fleece, was pursued by her father; when, to stop his progress, she tore Absyrtus in pieces, and scattered his limbs in his way.

ABTERODE, a town in the bailiwick of Bilstein, in Hesse-Cassel, in Germany, with 972 inhabitants, who find employment chiefly in making woollen cloth.

ABTHANES, in *History*, a title of honour used by the ancient inhabitants of Scotland, who called their nobles *thanes*, which in the old Saxon signifies *king's ministers*; and of these the higher rank were styled *abthanes*, and those of the lower *underthanes*.

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[1] Phil. Trans. No. 194.

ABU and CANDU, a group of twelve islands in the southern division of the Indian Ocean, to the south of the Maldives, in Lat. 5. 6. S. and Long. 74. 23. E. They are rocky, but have good anchorage, under the shelter of a reef. There are no inhabitants, nor has any good water been found.

ABU-ARISCH, the capital of the territory of the same name, on the Red Sea, in a fruitful plain, with rock-salt mines near it. It is in Lat. 16. 45. N. and Long. 42. 33. E.

ABUBEKER, or ABU-BECR, the first caliph, the immediate successor of Mahomet, and one of his first converts. His original name was Abdulcaaba, signifying *servant of the caaba or temple*, which, after his conversion to Mahometanism, was changed to Abdallah, *servant of God*; and on the marriage of the prophet with his daughter Ayesha, he received the appellation of Abu-Becr, *Father of the virgin*. Illustrious by his family, and possessed of immense wealth, his influence and example were powerful means of propagating the faith he had adopted, and in gaining converts to the new religion. Abubeker was a sound believer; and although he lived in the greatest familiarity with Mahomet, he had always the highest veneration for his character. He vouched for the truth of his revelations after his nightly visits to heaven, and thus obtained the appellation of the *faithful*. He was employed in every mission of trust or importance, was the constant friend of the prophet, and when he was forced to fly from Mecca, was his only companion. But notwithstanding his blind devotion to Mahometanism, his moderation and prudence were conspicuous in checking the fanatical zeal of the disciples of the new religion on the death of Mahomet. This event threatened destruction to the doctrines of Islamism. Its followers could not doubt that it had taken place, and they were afraid to believe it. In this uncertainty and fluctuation of belief, Omar drew his sword, and threatened to cut in pieces all who dared to assert that the prophet was dead. Abubeker, with more coolness and wisdom, addressed the people, *Is it*, says he, *Mahomet whom you adore, or the God whom he has revealed to you? Know that this God is alone immortal, and that all those whom he has created are subject to death.* Appeased and reconciled by this speech, they elected him successor to Mahomet, and he assumed the modest title of caliph, which has continued with all his successors. Ali, the son-in-law of the prophet, regarding the elevation of Abubeker as a violation of his legal rights to the succession, refused at first to recognise the appointment, till he was forced by threats into compliance and submission. His partisans, however, still considered him as the legitimate successor, and their opinion has prevailed among many Mussulmans, who believe that the sovereign authority, both spiritual and temporal, remains with his descendants.

Abubeker first collected and digested the revelations of Mahomet, which had hitherto been preserved in detached fragments, or in the memories of the believers; and to this the Arabians gave the appellation *Almoshaf*, or the Book. He died in the 13th year of the Hegira, respected as a prudent and equitable ruler.

ABUCCO, ABOCCO, or ABOCHI, a weight used in the kingdom of Pegu. One abucco contains 12½ teccalis; two abuccos make a *giro* or *agire*; two *giri*, half a *biza*; and a *biza* weighs an hundred teccalis; that is, two pounds five ounces the heavy weight, or three pounds nine ounces the light weight of Venice.

ABUCHOW, a village in Russia, in the circle of Bogoradsk, and government of Moscow, where are mills belonging to the emperor, from whence 10,000 poods of gunpowder are annually delivered. It stands on the river Kliasma, whose stream turns seven mills.

ABUKESO, in commerce, the same with ASLAN.

ABUKOR, a town near Lepanto, in the province of Aimabochte, in Turkey in Europe.

ABULAHOR, a town of Turkey in Europe, on the river Aspre, in the Sandschac or Standard of Joanina, and province of Romelia.

ABULAWO, a town of Russia, in the circle of Krapiwna, and government of Tula.

ABULFARAGIUS, GREGORY, son of Aaron, a physician, born in 1226, in the city of Malatia, near the source of the Euphrates in Armenia. He followed the profession of his father, and practised with great success; but he acquired a higher reputation by the study of the Greek, Syriac, and Arabic languages, as well as by his knowledge of philosophy and divinity; and he wrote a history which does great honour to his memory. It is written in Arabic, and divided into dynasties. It consists of ten parts, being an epitome of universal history from the creation of the world to his own time. The parts of it relating to the Saracens, Tartar Moguls, and the conquests of Jenghis Khan, are esteemed the most valuable. He professed Christianity, was bishop of Aleppo, and is supposed to have belonged to the sect of the Jacobites. His contemporaries speak of him in a strain of most extravagant panegyric. He is styled the *king of the learned, the pattern of his times, the phœnix of the age, and the crown of the virtuous.* Dr Pococke published his history with a Latin translation in 1663, in 2 vols. 4to.

ABULFAZEL, who is called by Sir William Jones, "a learned and elegant," and by others, "the most elegant" writer that the East has produced, was vizier and historiographer to the Great Mogul, Akber. We have not been able to discover the year of his birth, but his death took place in 1604, when he was assassinated on his return from a mission to the Decan. According to some writers, this foul act was perpetrated at the instigation of the heir apparent to the throne, who had become jealous of the minister's influence with the emperor. Akber greatly lamented the loss of a man who was not only an able minister of state, but of such talents as a writer, as to make it a common saying in the East, "that the neighbouring monarchs stood more in awe of his pen than of the sword of his master." He wrote, by the emperor's command, a history of his reign, which came down to the forty-seventh year, in which he was assassinated. In connection with this, he also compiled a volume, intended to exhibit a geographical and statistical view of the empire, and of the revenue, household, and expenses of the sovereign. It likewise embraces an account of the religion of the Hindoos, of their sacred books, and their several sects in religion and philosophy. This work, which is fraught with much curious and valuable information, is known under the name of the *Ayeen Akbery*. It has been translated into English with great accuracy by Mr Francis Gladwin. The translation was undertaken and published at Calcutta, under the intelligent patronage of Mr Hastings. "Such a work," he said, in a minute of council, "could not but prove peculiarly useful; as it comprehends the original constitution of the Mogul Empire, described under the immediate inspection of its founder, and will serve to assist the judgment of the Court of Directors on many points of importance to the first interests of the company."—The Calcutta edition, published in 1783–6, in three volumes quarto, is a splendid book, and the most valuable in every respect, as the London reprints are by no means accurate.

ABUNA, the title given to the archbishop or metropolitan of Abyssinia.

ABUNDANT NUMBER, in *Arithmetic*, is a number, the sum of whose aliquot parts is greater than the number itself. Thus, the aliquot parts of 12 being 1, 2, 3, 4, and 6, they make, when added together, 16. An abundant number is opposed to a *deficient* number, or that which is greater than all its aliquot parts taken together; as 14, whose aliquot parts are 1, 2, and 7, which makes no more than 10; and to a *perfect* number, or one to which its aliquot parts are equal, as 6, whose aliquot parts are 1, 2, and 3.

ABUNDANTIA, a heathen divinity, represented in ancient monuments under the figure of a woman with a pleasing aspect, crowned with garlands of flowers, pouring all sorts of fruits out of a horn which she holds in her right hand, and scattering grain with her left, taken promiscuously from a sheaf of corn. On a medal of Trajan she is represented with two cornucopiæ.

ABUS, in *Ancient Geography*, a river of Britain, now the Humber.

ABUSAID, EBN ALJAPTU, sultan of the Moguls, succeeded his father anno 717 of the Hegira. He was the last monarch of the race of Jenghis Khan, who held the undivided empire of the Moguls; for after his death, which happened the same year that Tamerlane was born, it became a scene of blood and desolation, and was broken into separate sovereignties.

ABUSIR, a town of Egypt, twelve hours to the west of Alexandria. It is in a ruinous condition, with remains of an ancient temple, and many scattered vestiges of former extent and population.

ABUSUMBOL, or EBSAMBUL, or IPSAMBUL, a town on the Nile, in Nubia, to the south of the island of Kogos, in Lat. 22. 20. 11. N. and Long. 31. 40. 57. E. About twenty feet above the river is a temple hewn out of the perpendicular face of the rock. At the entrance are six colossal figures of young persons, in bas-relief, and the space between them filled with hieroglyphics which denote a very high antiquity.

ABU-TEMAN, an Arabian poet, of whom, though but little can be said, it would be improper altogether to omit, because he was held to be the prince of Arabian poets, during the best periods of Arabian literature. He was born about the year 787; and, happily for him, under sovereigns whose love and patronage of literature made poetical eminence an unfailing road to wealth and honour. Part of his early life was passed in Egypt, in the servile capacity of administering drink to those who frequented a mosque. It is also said, that he was for some time employed in the trade of a weaver at Damascus. But his talents for poetry soon lifted him from this humble sphere, and removed him to Bagdad, where the caliphs loaded him with presents, and treated him with the greatest respect. If we are to believe the Arabian historians, a single poem sometimes procured for him many thousand pieces of gold. So highly was he esteemed by his countrymen, that it was said "no one could ever die whose name had been praised in the verses of Abu-Teman!" His own life was very short, for he died in his fortieth year; "the ardour of his mind," says one of his contemporaries, "having wasted his body, as the blade of an Indian scimitar destroys its scabbard." Besides being a great original poet, he was the compiler of three collections of select pieces of the poetry of the East; the most esteemed of which collections is that called the *Hamasa*. Sir William Jones speaks of it as a very valuable compilation. Many of the elegant specimens of Arabian poetry contained in Professor Carlyle's well-known work, were translated from pieces contained in this miscellany. A large portion of it, with a Latin version, was annexed by Schultens to his edition of Erpenius's *Arabic Grammar*, published at Leyden in 1748; and there are also many extracts from it in the collection entitled *Anthologia Arabica*, published at Jena in 1774.

ABUTILON, in *Botany*, the trivial name of several species of the sida.

ABUZOW, a town of Russia, in the circle of Sergatsch, and government of Rishegorod.

ABYDOS, in *Ancient Geography*, anciently a town built by the Milesians, in Asia, on the Hellespont, where it is scarce a mile broad, opposite to Sestos, on the European side. It was famous for Xerxes's bridge, and for the loves of Leander and Hero (Musæus, Ovid); celebrated also for its oysters (Ennius, Virgil). The old castle of the Dardanelles, built by the Turks, lies a little southward of Sestos and Abydos.

ABYDUS, in *Ancient Geography*, an inland town of Egypt, between Ptolemais and Diospolis Parva, famous for the palace of Memnon and the temple of Osiris.

ABYLA (Ptolemy, Mela), one of Hercules's pillars, on the African side, called by the Spaniards *Sierra de las Monas*, opposite to Calpe in Spain, the other pillar; supposed to have been formerly joined, but separated by Hercules, and thus to have given entrance to the sea now called the *Mediterranean*; the limits of the labours of Hercules. (Pliny.)

ABYSS, in a general sense, denotes something profound, and, as it were, bottomless. The word is originally Greek, *αβυσσος*; compounded of the privative *α*, and *βυσσος*, q. d. without a bottom.

ABYSS, in a more particular sense, denotes a deep mass or fund of waters. In this sense, the word is particularly used in the Septuagint, for the water which God created at the beginning with the earth, which encompassed it round, and which our translators render by *deep*. Thus it is that darkness is said to have been on the face of the abyss.

ABYSS is also used for an immense cavern in the earth, in which God is supposed to have collected all those waters on the third day: which, in our version, is rendered the *seas*, and elsewhere the *great deep*. Dr Woodward, in his *Natural History of the Earth*, asserts, that there is a mighty collection of waters inclosed in the bowels of the earth, constituting a huge orb in the interior or central parts of it; and over the surface of this water he supposes the terrestrial strata to be expanded. This, according to him, is what Moses calls *the great deep*, and what most authors render *the great abyss*.—The different arguments concerning this subject may be seen collected and amplified in Cockburn's *Inquiry into the Truth and Certainty of the Mosaic Deluge*, p. 271, &c.

ABYSS is also used in *Heraldry* to denote the centre of an escutcheon. In which sense a thing is said to be borne in abyss, *en abysme*, when placed in the middle of the shield, clear from any other bearing: He bears azure, a fleur-de-lis, in abyss.

ABYSSINIA.

ABYSSINIA, a large country on the eastern coast of Africa, and the chief of the native kingdoms of that continent, is bounded on the east by the Red Sea, on the north and west by the barren sands of Nubia, on the south by unknown ranges of desert, and barbarous kingdoms. The country itself is diversified by many chains of high and rugged mountains. The loftiest appears to be that of Lamalmon, which, with the mountains of Samen to the west, and other branches stretching in various directions, nearly cover all Tigré or Northern Abyssinia. These mountains are of various shapes, and tost about in a confusion so wild, that Bruce, with some exaggeration, has compared some of them to pyramids pitched on their bases. The assertion made by the early missionaries, that the Alps and Pyrenees are but mole-hills in comparison, has proved to be a ridiculous hyperbole; but snow does actually fall on some of the more lofty pinnacles—a fact which, under the tropics, indicates a very great elevation. In the west, the mountains of Gojam are not nearly so high, but cover a great extent of territory. They are inhabited by the Agows, a primitive pastoral race, who worship the Nile.

General view of Abyssinia.

In our climates, great ranges of mountains render a region picturesque indeed in its appearance, but naked and unfertile. It is quite otherwise beneath the burning suns of the tropic. Exposed to their influence, soils of the greatest natural fertility soon become parched and arid: they must be watered and even inundated, ere crops can cover them. Fortunate under this latitude is the country which, like Abyssinia, is filled with storehouses of water, which, formed in the mountains, are thence diffused over every part of its surface. Thus its numerous plains and valleys are not surpassed in fertility by any region in the world. Rice, the great Asiatic grain, has not been introduced; but on many parts of its varied surface, wheat, barley, and other grains of the temperate climates, are copiously raised. The low and hot grounds are chiefly covered with teff, a weak herbaceous plant with a thin stalk, and grains not much larger than the head of a pin, out of which is made the bread in general use throughout the kingdom. A black bread for the poorest classes is made from a still coarser grain called tocusso. The horses are strong and beautiful, and the herds numerous, among which is a species of oxen with horns of monstrous length, introduced by the Galla. Bees swarm on all the hills, and Abyssinia is a land flowing with excellent honey. The nobler animals of prey, the lion, and the tiger, are scarcely known; but ferocious and untamable hyenas haunt in crowds the scenes of slaughter which the country too often presents: they roam by night through the cities, and enter even the houses. The buffalo is here wild and furious, roaming through the most lonely and unfrequented tracts. Along the banks of the rivers, amid the copious moisture there afforded, and the rank vegetation to which it gives rise, those huge animals, the elephant, the rhinoceros, the river-horse, and the crocodile, toss their unwieldy bulk. All the ravages committed by them, however, are trivial when compared with what Abyssinia suffers from swarms of locusts, which here, as in other parts of the East, appear sometimes in close array like regular armies, and in a few days devour the harvest of provinces.

The numerous waters of Abyssinia unite in two great rivers, which though they do not, as some have supposed, constitute the Nile, reach and swell the channel of that great river. All the western mountains are drained by the Tacazze, which rolls for a great part of its course through deep valleys, choked with luxuriant vegetation, and tenanted only by wild beasts and human savages. It then penetrates the sands of Nubia, and joins the Nile in the district of Berber. The numerous streams of Gojam unite in forming the Dembea, a great lake in the heart of the kingdom, out of which flows the Azergue, or Blue River, which many of the moderns have obstinately held to be the main stream of the Nile. Bruce, indeed, on viewing its sources, announced himself as having accomplished the object of an arduous journey, by discovering the springs of that famous river. It is now, however, considered to be a clear point, that when the Blue River, after taking a semicircular sweep through Abyssinia, and passing its precincts, meets the Abiad, or White River, the latter, coming from sources far to the west and in the interior of Africa, is a much deeper and greater stream, and entitled to be considered as the real Nile, to which the other is only a tributary.

Abyssinia, though thus mountainous, does not contain many mineral productions; for the gold, of which a good deal passes through it, is brought from countries farther in the interior. It has, however, on its frontier a great plain, about four days' journey across, covered entirely with salt. There is generally a depth of two feet of perfectly pure and hard salt on the surface; below, the mineral is coarser and softer. Both the digging for the salt and the carrying it off are very dangerous operations, from the vicinity of barbarous plundering tribes, always ready to attack those employed, who must therefore be associated in numerous and well-armed bodies.

Abyssinia was evidently included by the ancients under that wide territory to which they gave the name of Ethiopia, and which includes all Africa south of Egypt, and of the mountain range of Atlas. It formed no part, however, of the celebrated Ethiopia, whose capital was Meroe. This region, involved in dim religious mystery, which conquered Egypt, and which Cambyses vainly sought to conquer, comprised the territory along the Upper Nile now known by the name of Nubia. Abyssinia, barred by lofty mountains, by forests, marshes, and deserts, is not recorded as having ever been reached by any land expedition. Neither Petronius, when sent by Augustus against Queen Candace, nor Probus in his expedition against the Blemmyes, arrived even at Meroe; and consequently did not make an approach towards Abyssinia. Herodotus indeed mentions the isle of the Exiles, on which a numerous body of deserters from Psammetichus, king of Egypt, were settled by the Ethiopian monarch. As that historian, however, evidently understands this isle, by which, according to the practice of antiquity, he means a region inclosed by river-channels, to extend along the Nile, which river he understood to come from the west, it would appear that this description must have pointed either to Sennaar, or some region on the Bahr-el-Abiad, and could comprehend no part of the modern Abyssinia. The only slight notices which the ancients gleaned respecting that country, were obtained by the way of its coast, situated on the Red Sea.

History

It is a firm article in the national creed of Abyssinia, that the Queen of Sheba, who came from the remotest south to listen to and admire the wisdom of Solomon, was their queen; and that it was Abyssinia which furnished the splendid and costly presents which she brought to Jerusalem. They add with equal confidence, that her majesty returned pregnant by that great monarch, and brought forth a son, Menilek, whose posterity, though with some interruption, continued to rule over Abyssinia; the monarchs of which country thus boast themselves to be of the race of Solomon. This genealogy, however deeply rooted in Abyssinian conviction, does not seem tenable on any rational grounds. The two leading features were the profusion of aromatics and the numerous camels. But the camel is an animal decidedly Arabian, has never been naturalized in Abyssinia, nor is at all suited to the rugged surface of that country; and even if an Abyssinian queen had possessed a stock of these animals, she would have had no convenience, or even possibility, in that era of navigation, of transporting them across the Arabian Gulf. The abundance of spices is equally foreign to the rugged soil of Abyssinia, and characteristic of that of Sabea, or the happy Arabia of the classic writers, to which, indeed, every indication points as identical with the Sheba of Scripture. The commerce between Sheba and Judea is often mentioned in the sacred writings, and always as a land intercourse, carried on by camels, and in numerous caravans. It may be observed, also, that the inspired writers nowhere give the least hint of that species of intimacy between Solomon and her majesty, upon which the Abyssinians found this genealogical claim.

Strabo has given some notices of Abyssinia, not in connection with Egypt or with Africa, but with Arabia, as forming the western coast of the Arabian Gulf. It would be difficult, and not very edifying, to verify the successive chain of his positions; but we may recognise already the leading features which distinguish modern Abyssinia; the vast herds and huntings of the elephant; the extreme rudeness of many among the native tribes, living in caves under the shelter of trees; the prevalence of barbarous and dissolute manners; the use of blood as an article of diet; copious libations of hydromel among the higher ranks, and of an infusion of grain among the lower. He represents them as wrapping pieces of flesh in skins, and swallowing both together; probably an erroneous version of the custom of wrapping slices of meat in teff cakes, and stuffing them down in huge mouthfuls. After a long range of this coast came another, producing incense, aromatics, and even a species of cinnamon. This coast, evidently that of Berbera, terminated in the Southern Horn; the region beyond which was unknown to Strabo, and to Artemidorus, from whom his information was chiefly derived.

An important series of early Abyssinian history has been disclosed by a very slight and casual circumstance. An Egyptian monk, named Cosmas Indicopleustes, having penetrated into Abyssinia, was employed by Elesbaan, the king, to copy two inscriptions on a chair and small column of white marble, which had been erected at the port of Adulis. One of these inscriptions commemorates conquests made in Asia by Ptolemy Euergetes, king of Egypt; the other relates conquests which extended over the greater part of Abyssinia, the provinces of which are mentioned almost under their modern names. Such extensive dominion obtained by Euergetes in this part of Africa excited considerable surprise, especially as no hint of it had been given in any of the Greek writers. Mr Salt copied at Axum a tablet, in which similar exploits, almost in the same terms, are ascribed to Aeizanes, king of the Axumites; and considering the silence of ancient authorities, and that such an extent of Egyptian conquest was rather improbable, he inclines to believe that the second inscription of Cosmas, the commencement of which had been obliterated, related not to Euergetes, but to Aeizanes, and was only a repetition of the Axum inscription. Dr Vincent, however, still adhered to the opinion which makes Ptolemy the subject of both these inscriptions, and consequently supposed him to have made the conquest of Abyssinia.

Some notices respecting the early state of Abyssinia are found in the work entitled *Periplus of the Erythrean Sea*, written by Arrian, a merchant of Alexandria, and intended seemingly as a coasting guide for the merchants of that capital. In this work Adulis, situated near the modern Masuah, is described as the great emporium of this region, the trade of which consisted chiefly in the exportation of fine ivory, and rhinoceros' horns; in return for which, they imported wine, oil, and many manufactures and luxuries produced in the Roman empire. The ivory was brought chiefly from Coloe, situated three days' journey in the interior; while five days beyond was Axum, the metropolis, and a city of great magnificence, as its ruins still attest. The coast beyond Adulis, forming now the territory of the Baharnegash, was ruled by a prince called Zoskales, who is described as highly polished and intelligent, and as giving the most hospitable reception to the strangers who visited this coast. Abyssinia appears thus by its intercourse with Egypt to have acquired a degree of improvement and refinement which it lost at a subsequent period.

The first event in the modern history of Abyssinia was the introduction of Christianity by Frumentius, in the fourth century. That religion was then embraced by the court and a great proportion of the inhabitants; and the church of Abyssinia has since, with a short interval, during which the Romish religion prevailed, continued subject to the patriarch of Alexandria, and has observed the peculiar doctrines and ritual of the Alexandrian church. Soon after this period reigned Elesbaan, the most powerful and only conquering prince that ever occupied the throne of Abyssinia. Involved by religious antipathies in hostility with the Sabæans or Homerites, on the opposite coast of Arabia Felix, he invaded, and appears to have made himself completely master of that country. He assembled next a formidable force, with which he advanced and laid siege to the already sacred city of Mecca. Tradition represents his army as partly mounted upon elephants, from which this expedition was termed the war of the elephant. According to the Arabian historians, a miraculous shower of stones destroyed the Ethiopian army; and we may probably conclude that famine and disease, in this barren and dreary region, thinned its ranks, and compelled it to a disastrous retreat.

Notwithstanding this check, the Ethiopian monarchs appear to have held sway over a considerable part of Abyssinia, till the time when the rise of the religion of Mahomet, and its diffusion by force of arms, changed the face of the East. The Mahometans boast that they established their faith in Abyssinia; but no tradition or history of that country gives any countenance to the assertion, nor does its present state exhibit the least vestige of such a change. It appears, however, that they were driven before this torrent of fanatical conquest out of all their possessions in Arabia; that Islamism even crossed the sea, and established itself in Adel and other territories, by which Abyssinia is closely hemmed in, and with whose people she was ever after involved in rooted hostility, both religious and political.

From this time we are reduced to the dim lights of Abyssinian tradition, which appear, however, to record a remarkable revolution. The Mahometan conquest had driven before it a considerable number of Jews, who, amid the calamities of their country, had established themselves in different parts of Arabia. They sought refuge in Abyssinia, where they became numerous and powerful, and even established an independent dominion in the province of Samen. Judith, a Jewish princess, possessed of more than manly courage, and ruthless ambition, conceived the design of usurping for herself and her country the entire sovereignty of the kingdom. Availing herself of the singular custom of immuring the whole royal family on the top of a mountain, she gained possession of this post, and made a general massacre of all those who could advance any claim to the throne. The infant king, however, was carried off by some faithful adherents, and conveyed to Shoa, where his authority was acknowledged; while Judith reigned for forty years over the rest of the kingdom, and transmitted the crown to her posterity. In 1268, however, the house of Solomon, as it was called, (chiefly, it is said, through the influence of Tecla Haimanout, a monk highly revered for sanctity,) was restored in the person of Icon Amlac.

From the time of Icon Amlac the Abyssinians appear to have kept regular annals, and record a list of successive kings. Mr Bruce has even drawn up from these annals a somewhat detailed history of Abyssinia. But a narrative containing only the contests of these barbarous tribes, mingled with superstition and fable, and illumined by few traits of honour and generosity, is little calculated to edify or interest. For a long time it was diversified chiefly by the wars with Adel, a country situated along the coast of the Arabian Gulf. The Adelians had embraced the Moslem creed, so that national antipathies were heightened by religious bigotry, which rages so fiercely in uninformed minds. The war was therefore carried on with excessive fury, each party signalizing their victory by burning towns and villages, and making a general massacre of the people. After a contest of several centuries, Adel appears to have been completely humbled, and is no longer mentioned among the enemies of Abyssinia. Violent dissensions then arose on the subject of religion. The Romish faith was introduced by a succession of missionaries from Europe; and several of the kings not only embraced, but endeavoured to impose this religion by violence upon their subjects. This gave rise to civil wars, which did not terminate even after the missionaries had been banished, the Catholic system abolished, and the nation had been replaced under the spiritual sway of the Patriarch of Alexandria.

About two centuries ago, Abyssinia began to suffer from a new and formidable enemy, by which she has ever since been more and more hardly pressed. From the southern interior regions the Galla, a negro and Pagan race of the most uncouth and savage aspect, and surpassing in ferocity even the Abyssinians themselves, began a series of desolating inroads, sparing neither age nor sex. For a long time they succeeded only in desultory incursions, and were uniformly routed in the open field; but at last, taking advantage of the dissensions in which the kingdom was still plunged, they insinuated themselves into the service of different chiefs, and acquired a degree of discipline which rendered them truly formidable. They have thus finally succeeded in overrunning all the central and finest portions of the kingdom, and leaving to the native rulers only two detached and severed portions.

Progress of Discovery.

After this rapid sketch of Abyssinian history, it will be a more interesting object to trace the steps by which the country was penetrated and explored by Europeans, and their observations on the peculiar and striking features of nature and society which it presents.

About the year 330, an ecclesiastic named Frumentius, who had been travelling with his relation, Meropius, a Tyrian philosopher, and who, at an island in the Red Sea, had become acquainted with some Abyssinians, represented to Athanasius, the patriarch of Alexandria, the wish of these people to have Christianity introduced into their country. Frumentius was accordingly consecrated Bishop of Axum by the patriarch, and appears to have made many converts among the Abyssinians. But as Constantine the Roman Emperor had embraced Arianism, and was at variance with the patriarch of Alexandria, he was desirous to recall Frumentius, either that he might appoint an Arian bishop, or that Frumentius might be re-consecrated by one of that persuasion. With this view he wrote a letter to the monarch of Abyssinia. By whom this letter was conveyed is not certain, though it is probable that it was by a person named Theophilus, who travelled into that country about A. D. 333. The only notice which remains of the journey of Theophilus is given by Philostorgius (*Hist. Eccles.*), and it is very meagre. Theophilus found the descendants of some Syrians in Abyssinia, sprung, he supposes, from a Syrian colony planted there in the time of Alexander the Great.

In the year 533, the conquests of the Abyssinians in Arabia, and the warm professions of friendship which they held out to the Roman empire, induced Justinian to send an embassy into that remote country, with the hope of persuading its sovereign to employ his forces then in Arabia against the Persian monarch. At this period the Abyssinians were acquainted with the arts of navigation, and had recently imbibed the spirit of trade, and acquired the sea-port of Adule, from which they penetrated along the African coast, as far as the equator, in search of gold, emeralds, and aromatics. For this important commission Justinian selected Nonnosus, descended from a family of ambassadors. He took the route of the Nile, from which he crossed to the Red Sea, and landed at the port of Adule. Though the distance of this place from Axum, at that period the residence of the sovereigns of Abyssinia, is only fifty leagues, yet the winding passes of the mountains which lie between them detained Nonnosus fifteen days. He was received with great pomp and favour by the Abyssinian monarch, Amda, or Ameda; but we are not very distinctly informed as to the fate of his mission. Of his original narrative, some extracts only are preserved in the *Bibliotheca* of Photius, and in the *Chronographia* of John Malala. From these, among other particulars, we learn that Nonnosus saw, in his passage through the forests which intervene between Adule and Axum, an immense number of wild elephants; and that the Abyssinian monarch gave audience in an open field, seated on a lofty chariot drawn by four elephants superbly caparisoned, and surrounded by his nobles and musicians. In his hand he held two javelins, and a light shield; his clothing was a linen garment and fillet; and though thus imperfectly covered, he displayed a profusion of gold chains, collars, and bracelets, adorned with pearls and precious stones. Nonnosus represents Axum as large and populous. In detailing his passage over the mountains of Taranta, he remarks the great contrast of the seasons on different sides of it; from Ave to the coast, it was summer and harvest time; whereas from Ave to Axum, and the rest of Abyssinia, it was winter. The truth of this observation is amply confirmed by Mr Salt.

Cosmas.

About the same period Cosmas, surnamed *Indicopleustes*, or the Indian Navigator, visited Adule. It was the design of this author, in publishing his work entitled *Topographia Christiana*, to confute the heretical opinion that the earth is a globe, and offer proofs that it was a flat oblong, as represented in the Scriptures. His voyage was performed A. D. 522, and his book published at Alexandria A. D. 547. Photius, to whom we are indebted for many curious extracts from works now lost, gives some interesting passages from it; and the complete work was published by Montfaucon, at Paris, in 1707, in the *Nova Collectio Patrum*, tom. ii. The most valuable part of it has been published in French and Greek, by Melchisidec Thevenot, in his *Relations de Divers Voyages Curieux, non encore publiées ou traduites*, Paris, 1682. To this author we are indebted for the Adulic inscriptions. It appears that Elesbaan, king of the Axumites, had ordered the governor of Adule to send him a copy of these inscriptions; and the governor employed Cosmas, who happened to be there at that time, and one Menas, a merchant, for that purpose. Till Mr Salt examined these inscriptions, during his first journey, they had always been regarded as forming only one; though in this view their meaning was not very clear, and they were at variance with authenticated history: but he satisfactorily proved, that instead of being a single inscription, referring exclusively to Ptolemy Euergetes, there were two distinct inscriptions, one of which refers to Ptolemy, and the other to the affairs of Abyssinia. The former inscription, among other things, mentions that Ptolemy and his father were the first that brought elephants from the Troglodytes and Ethiopia.

Besides the interesting information which Cosmas affords respecting the port and inscription of Adule, he particularly describes the trade of the Axumites along the African coast of Barbaria or Zingi, and as far as Trapobane, Ceylon; and mentions, that every other year the king of Axum sent several persons of distinction to traffic with the natives of Agow for gold, which they bartered for cattle, salt, and iron. The journey commonly occupied six months. He represents the fountains of the Nile as in the vicinity of Agow, which sufficiently points it out as the country of the Agows mentioned by Peter Paez, who travelled in Abyssinia in the beginning of the seventeenth century.

Respecting Abyssinia, the notices of travellers are few and very meagre, from the time of Cosmas and Nonnosus, to the conclusion of the fifteenth century. We find it mentioned by Marco Polo, and by Ibn El Wardi, an Arabian author; and some slight notices, particularly of the religious missions into that country, till the year 1500, are supplied by Renaudot, from the Coptic writers, in his *Historia Patriarcharum Alexandrinorum*, Paris, 1713.

At the close of the fifteenth century, the Portuguese missions into Abyssinia commenced: they originated in rather a singular circumstance. John II. king of Portugal was extremely anxious to discover the residence of Prester John, who had long been represented in Europe as a Christian sovereign of great power, ruling somewhere in the centre of Asia. For this purpose, John sent Peter Covilham and Alphonso or Michael de Payva into Asia: the latter soon died, but the former, during his abode on the western coasts of the Red Sea, hearing much of the Abyssinian emperor, and of his being a Christian, concluded that he had found the object of his search. He immediately conveyed this information to his own court, and proceeded himself to Shoa, then the residence of the *Negush*, or monarch of Abyssinia. He was received and treated with great kindness and respect; but, according to the usual policy of the Abyssinian court at that period, he was not permitted to leave the country. An account of his residence is given by Damiano Goez, in his *Legatio Magni Indorum Presb. Joan. ad Emanuel Lusitaniæ*, Antwerp, 1552. King Emanuel, who was desirous of maintaining an intercourse with the sovereign of Abyssinia, (not less from commercial and political than religious motives,) sent an embassy into that country in the year 1520. At the head of this embassy he placed the famous Edward Galvan, who had been secretary of state, and ambassador in France, Germany, and Rome. The selection of such a man points out the importance which Emanuel attached to this mission. But unfortunately, Galvan, being extremely old, was unequal to the fatigues of so long and dangerous a journey, and died soon after the embassy entered the Red Sea. In his stead Rodriguez de Lima was appointed; and Francisco Alvarez, who had been chaplain to Galvan, was continued in the same office by Rodriguez. Their journey from the coast of the Red Sea was long and troublesome, on account of the heat of the climate and the badness of the roads; but they arrived at the Abyssinian court on the 12th of April 1520, where they were received with much splendour and courtesy by the Emperor David. They were detained in Abyssinia six years, from various causes; and on their departure, the emperor requested Rodriguez to leave behind him his physician, John Bermudez, and a painter of his retinue, with which request the ambassador complied. Alvarez wrote a minute account of Abyssinia, of which there are several editions;—that published by himself at Lisbon in 1540; a Spanish translation from the Portuguese, published at Antwerp in 1557; an Italian translation from the Portuguese manuscript, published by Ramusio in his *Collection of Voyages*, lib. i., (which differs materially from the Lisbon edition); a French translation in 1558; and an English translation, in Purchas's *Collection of Voyages*. The value and accuracy of this author's statements have been differently appreciated; but it seems probable that several fabrications were published in his name; for Damiano Goez asserts that he had seen a journal written by Alvarez, very different from most of the published works.[1] In some respects, the description which he gives of Abyssinia is extremely valuable. No European traveller, since his time, has visited Angot, Amhara, and Shoa; the first a region occupied by the Pagan Galla, and bordering with some barbarous tribes near the Red Sea. This traveller visited Axum a short time before it was almost totally destroyed by the Turkish invasion, and he describes it as a large and beautiful place. According to him, none of the cities of Abyssinia contained more than fifteen hundred houses; a statement with which the assertion of Bruce, that Gondar, when he was there, contained ten thousand families, can hardly be reconciled.

In the year 1538, Bermudez was sent back to Portugal, as ambassador from the Abyssinian monarch; and after a short abode at Lisbon, he was ordered to return by the way of Goa, and take from that place some troops to reinforce the Abyssinian, who at this period had been compelled to take shelter from the Moors in the mountainous part of his kingdom. The reinforcement was landed at Massowa, and after a difficult journey through the mountainous passes and defiles, they joined the emperor. Bermudez published an account of his journey at Lisbon in 1565. There are also editions of it published at the same place in 1569 and 1615, which are very scarce. It was translated into English by Purchas (*Pilgrims*, l. vii. c. vii. p. 1149), and from thence into French by La Croze, (*Christianisme d'Ethiope*, p. 92-265.) But the greater part of his work relates to the victories, defeat, and death of the Portuguese general, Christopher de Gama; and is principally valuable from the description which he gives of some, otherwise little known, parts of the country, which he visited in the course of the war.

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[1] The translation of Ramusio was made from a manuscript supplied by Goez.

In the year 1556, Ignatius Loyola, at the urgent request of an Abyssinian priest called Peter, who had visited Rome, projected a new mission into Abyssinia, and by his influence with the king of Portugal, persuaded him to send an ambassador and a patriarch along with the missionaries. They went first to Goa, where they learned that an entrance into Abyssinia by the Red Sea would be extremely difficult and dangerous, if not quite impracticable, as the Turks carefully guarded the sea-coasts with their ships. In consequence of this intelligence, it was resolved that the ambassador and the patriarch should not attempt the journey; and of the missionaries only one arrived in Abyssinia. An account of this mission was published in 1615;[1] it contains a great deal of curious information, but ought to be read, like all the other accounts of the Jesuit missionaries, with great caution.

From this period till the close of the sixteenth century, Abyssinia was extremely difficult of access, in consequence of the Turks having exclusive possession of the sea-coast. At length, in 1589, Philip II. of Spain, anxious to renew the alliance between the two courts, sent a letter to the Abyssinian monarch by an Italian bishop, John Baptista, and a person of the name of Lewis de Mendoza, who was then settled at Diu, and was well acquainted with the commerce of the Red Sea. The bishop died during his journey, but Mendoza penetrated into Abyssinia, delivered his letter, and carried back one from the emperor to Philip. In consequence of his success, Mendoza was sent on a second mission, and sailed from Goa in February 1589, accompanied by Antonio de Monserrato, a Catalonian, and Peter Paez, a Spaniard. In their voyage they were shipwrecked and taken prisoners. This circumstance proved of great advantage to Paez, who, being a man of considerable talents, and of great activity of mind, as well as zeal, spent the seven years of his captivity in making himself a perfect master of the Arabian language. In consequence of the intelligence of their misfortune reaching Goa, two other missionaries were dispatched for Abyssinia; Abraham de Georgiis, a man of great learning and courage, and a thorough master of all the eastern languages, and Melchior de Sylva, by birth an Indian: only the latter, however, arrived in Abyssinia, the former having been taken and beheaded by the Mahometans. In the mean time, Peter Paez having been ransomed, found means to penetrate into Abyssinia, where he soon gained an ascendancy over the mind of the emperor. He is the first European who visited what the Abyssinians deem the sources of the Nile. He died in that country in the year 1622; and his manuscript, detailing the affairs of Abyssinia from the year 1556 to his death, was transmitted to Rome, where it is said to be still preserved. The only extract which has been printed from it relates to his journey to the sources of the Nile, and is given by Kircher in his *Œdipus Egyptiacus.* Paez was succeeded, in 1623, by Father Emanuel D'Almeyda, who travelled from Massowa, by Adejada, across the plain Serawe, and partly along the course of the Mareb, till he arrived at the monastery of Fremona, the usual residence of the missionaries. He was succeeded by another of the society of Jesuits called Antonio de Angelis, who was famous for his skill in the Amharic language. In 1624, Alphonso Mendez was sent patriarch into Abyssinia. He arrived at Fremona on the 21st of June in that year; but on account of the dangerous travelling through Tigré at that season, he was obliged to stay there till the October following, when he went to the residence of the emperor, by whom he was received with great pomp. His behaviour, however, was not such as to render him long a favourite; and he was ordered to retire to Fremona. Scarcely had he arrived there before he received a fresh order to leave the kingdom; and, not immediately complying, he was conducted to Massowa. He wrote the history of Abyssinia in Latin, a French translation of which was printed at Lisle in 1633.[2] During the residence of Mendez in this kingdom, Peter Heyling of Lubeck, a Lutheran, well versed in the Arabic, ingratiated himself into the favour of the *Abuna*, or metropolitan bishop of Abyssinia at Alexandria, and visited that country along with him; and he continued for several years, being highly esteemed by the court and the clergy, both on account of his skill and success in medicine, and his knowledge of the oriental languages, and of polemic divinity. Respecting the cause and period of his return there is some obscurity. Mendez asserts that he was ordered to leave the kingdom; whereas Ludolphus asserts that the emperor was very unwilling to part with him. He did not live to revisit Europe, having been put to death on his return either by the Arabs or by the bashaw of Suakem. An account of his life, and the few particulars which he transmitted to his friends respecting Abyssinia, were published in German, in the year 1724, along with an epitome, in the same language, of Geddes's *Ecclesiastical History of Ethiopia.* From the character and attainments of Heyling, in connection with the opportunities of observation and information which he enjoyed, there is no doubt that, had he lived to return to Europe, he would have added considerably to the stock of knowledge at that time possessed regarding this country.

In the suite of Alphonso Mendez was Father Lobo, who, during the greater part of the nine years that he resided in Abyssinia, was rector of the college of Fremona. His description of that country, and history of his travels, though simple and succinct, is much superior in clearness and accuracy to the relations of any of the travellers who had preceded him. Lobo resided for some time in the province of Damot, near the sources of the Nile. It has been supposed, though, we imagine, erroneously, that *A short Relation of the river Nile, of its Source and Current, by an Eye-witness,* which was first published in 1668, and afterwards republished by Dr Rotheram in 1791, was procured at Lisbon from Lobo himself. This account of the sources of the Nile differs in some respects from the account given in Le Grand's translation of Lobo. His work was originally published in Portuguese, but it is much better known in the French translation of Le Grand, and in the English translation by Dr Johnson.

In 1660, Father Tellez, at the request of the society of Jesuits, published his General History of Abyssinia under the following title: *Historia Geral de Ethiopia Alta, ou Preste Ioam,* &c. Coimbra, 1660, folio.[3] In compiling this work, he had the advantage of consulting all the relations which the missionaries had drawn up, as well as the annual letters which they had sent to the college of Jesuits at Lisbon; and, as is noticed in the title-page, the relation of Emanuel d'Almeyda is here abridged.

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[1] De Æthiopiæ Patriarchis, J. N. Barreto et Andrea Oviedo, P. N. Godigno. Lugduni, 1615.

[2] Rélation du Révérendissime Patriarche d'Ethiopie, Dom. Alphonse Mendez, touchant la conversion des ames qui s'est faite en cet Empire.

[3] An abridged translation of this work, entitled *Travels of the Jesuits in Ethiopia,* was published in the second volume of Knapton's *New Collection of Voyages and Travels,* Lond. 1711.

The Portuguese having lost their credit and influence in Abyssinia by the haughty behaviour of Mendez, the French resolved to use their endeavours to establish themselves in that country; and for this purpose Louis XIV. wrote a letter to the father of the emperor, who was then on the throne, which reached him, though by what means we are not informed. At the same time instructions were sent to M. Maillet, the French consul at Cairo, to second the plans of his court; and accordingly, having learned that the emperor was ill, he dispatched Poncet, a physician, to cure him. Along with Poncet was sent, by the influence of the Jesuits, Father de Brevedent, a man particularly conversant in astronomy. They embarked on the Nile on the 10th of June 1698, and arrived within a day and half's journey of Gondar on the 3d of July of the following year. Here the father died, and Poncet, having rested himself till the 21st of the same month, set out for Gondar. He particularly describes the public audience which was granted him by the emperor, and his rich and splendid attire. Respecting the latter, and also in what he says concerning Gondar, his accounts are considerably at variance with the relations of the Portuguese missionaries: hence the fidelity of his work has been called in question, especially by Le Grand, though on no sufficient grounds. Having succeeded in curing the Abyssinian monarch, he set out from Gondar in the summer of 1700, by the way of Massowa, and arrived safe in France, where he published a distinct account of his journey. A translation of it is given in Lockman's *Travels of the Jesuits.* The learned works of Ludolphus—*Historia Ethiopica*, Francof. 1681; *Commentarius in Historiam Ethiopicam*, Francof. 1691; and *Relatio Nova*, &c. 1693, must not be passed over: for though he chiefly compiled them from the writings of the Portuguese missionaries already mentioned, he was enabled to add considerably to their stock of information, by means of his great knowledge of the Ethiopian language,—by his conversations with Gregory, an intelligent and liberal Abyssinian priest, whom he invited from Rome to the court of Saxe-Gotha,—and by the report of Morat, an Armenian merchant, who had often been in Abyssinia. The *Theologia Ethiopica* of Gregory is published in Fabricius's *Lux Evangelii.*

In 1750, three Franciscans succeeded in penetrating as far as Gondar. From this time, Abyssinia was not reached by any European traveller, till the journey of Bruce.

Bruce's journey.

At the time when Mr Bruce entered Abyssinia, it was rent by civil war. The king Yasous, otherwise popular, had married a Galla princess, an unpopular step, in consequence of which an inveterate prejudice against her, her family, and the king himself, became rooted in the mind of the Abyssinians. The eldest son, after succeeding to the throne, having died, not without suspicion of poison, was succeeded by Ioas, the son of this Galla queen; but the evident preference which he showed for his relations belonging to this hated race, excited a violent discontent, which issued in the rebellion of Mariam-Barea, governor of the great province of Begemder. The king was obliged to call in the aid of Suhul Michael, the almost independent governor of Tigré. Michael immediately obeyed the call, and soon crushed Mariam-Barea, who sought refuge among the Galla, by whom he was killed. Michael himself, however, now the real master of the kingdom, could not brook the ascendancy of the king's Galla favourites; and having involved himself in a quarrel with Fasil, the most powerful among that body, both parties took arms. Michael gained a complete victory, after which he put the king to death, and substituted in his place Hannes, an old man, brother to the late monarch, in whose name he administered the affairs of the kingdom with absolute sway. He had before increased his power by marrying Ozoro Esther, widow of Mariam-Barea, and reckoned the greatest beauty in the kingdom. Such was the state of affairs when Mr Bruce entered Abyssinia; and as it is to him chiefly that we are indebted for what we know of the remarkable features of that country, it must be interesting to introduce here at some length the particulars of his journey.

On the 15th of November 1769, Mr Bruce, with two guides, left Arkeeko, on the eastern coast of Africa, and proceeded southwards for Gondar, the capital of Abyssinia. After an hour's journey, he pitched his tent near a pit full of rain water, where he remained all day; and being detained by some arrangements with his guides, did not finally set out till the evening of the 16th. For the short space they had travelled, the ground was covered with grass broader in the leaf than ours; but in a little time the soil became hard, dry, gravelly, and full of acacia, or Egyptian thorn. On the 17th, they changed their course from south to west, and soon arrived at a range of mountains standing so close to one another, that there was no passage between them except what was worn by torrents; the bed of one of which consequently now became their road. In the evening they pitched their tent at some distance from this torrent, which contained scarcely any water when they left it; but all the afternoon there had been an appearance of rain, with much thunder and lightning at a distance. On a sudden they heard a noise among the mountains louder than thunder; and instantly saw the torrent, swollen immensely by the distant rains, running like a rapid river, and the foremost part of it presenting a body of water about the height of a man. Having run for some time thus violently, the current, no longer supplied by the rains, began to diminish, and by the next morning was entirely gone. Among these mountains the nights are cold even in summer.

On the 18th the journey was resumed, following the bed of the torrent, now almost dry, though the stones were rendered very slippery by the quantity of rain which had fallen. Leaving this disagreeable road, they came to a fine rivulet; which being the first clear water they had seen from the time Mr Bruce left Syria, was exceedingly agreeable. They proceeded along the banks of this river for some time; and soon after leaving it, they came to another of the same kind; but next day were obliged to resume their course in the bed of a torrent. The mountains in this part of the world are excessively rugged and full of precipices, entirely destitute of soil, and covered with loose stones of a black colour. On the side of the torrent in which they marched, however, there grew very large sycamore trees, some of them little less than 7½ feet in diameter. Their branches afforded shelter to an infinite number of birds, many of them without song, but others having notes very different from the European kinds, and peculiar to the continent of Africa. Most of those which had very beautiful colours were of the jay or magpie kind. The trees were loaded with figs; but they came to nothing, by reason of the ignorance of the savages, who knew not the process of caprification. The streams of water themselves, which at this season were found so delightful, run only after October; they appear on the other side of the mountains when the summer rains in Abyssinia are ceasing; at other times no water is to be met with, excepting what is contained in stagnant pools.

On the 20th of November they began to ascend the high mountain of Taranta. Their road was now exceedingly rugged and uneven, intersected with monstrous gullies and holes made by the torrents, as well as by huge fragments of rocks which had tumbled down. It was with the utmost difficulty that they could carry the astronomical instruments up the hill; in which work Mr Bruce himself, and one of his attendants named *Yasine*, a Moor, bore a principal share. The only misfortune they met with was, that their asses, being unloaded, and committed to the care of a single person, refused to ascend this barren mountain; and in spite of all that their drivers could do, set off at a brisk trot for the fertile plains below. Luckily, however, they were afterwards recovered by four Moors sent after them, and the journey resumed without any material interruption.

Taranta is so destitute of earth, that there was no possibility of pitching a tent upon it; so that our travellers were obliged to take up their lodging in one of the caves with which it abounds. The under part of the mountain produces in great plenty the tree called *kolquall*, which was here observed in greater perfection than in any other place throughout the whole journey. The middle part produced olives, which bore no fruit; and the upper part was covered with the oxycedras, or Virginia cedar, called *arze* in the language of the country. On the top is a small village named *Halai*, inhabited by poor shepherds, who keep the flocks of the wealthy inhabitants of the town of Dixan below. They are of a dark complexion, inclining to yellow; their hair black, and curled artificially by means of a stick, and which our author supposes to be the same with the *crisping-pin* mentioned Isa. iii. 22. The men have a girdle of coarse cotton cloth, swathed six times round their middle; and they carry along with them two lances, and a shield made of bulls' hides. Besides these weapons, they have in their girdles a crooked knife with a blade about sixteen inches in length, and three in breadth at the lower part. There is here great plenty of cattle of all kinds; the cows generally milk-white, with dewlaps hanging down to their knees; their horns wide like those of the Lincolnshire cattle, and their hair like silk. The sheep are all black, both here and throughout the province of Tigré; having hair upon them instead of wool, like the rest of the sheep within the tropics, but remarkable for its lustre and softness, without any bristly quality. On the top of the mountain is a plain, which, at the time our author was there, they had sown with wheat. The air seemed excessively cold, though the barometer was not below 59° in the evening. On the west side the cedars, which on other parts are very beautiful, degenerate into small shrubs and bushes.

The road down this mountain was for some time not inferior in ruggedness to that by which they had ascended: but as they approached Dixan, it improved considerably. This is the first town on the Abyssinian side of Taranta. It is seated on the top of a hill of a form exactly conical, surrounded by a deep valley like a ditch; and there is no access to it but by a path which winds round the hill. The inhabitants were formerly exterminated by Michael Ras; and the succeeding race were found by Mr Bruce composed of the worst characters from the territories of the Baharnagash and the province of Tigré, on both of which it borders. Here he was in danger from the treachery of his guide Saloome, who wished to have decoyed him into the power of some assassins. Finding that this could not be done, he surrounded Mr Bruce and his retinue with a body of armed men; but they were dispersed by the authority of Hagi Abdelcarder, who had received orders to provide for the safety of the travellers. The only trade carried on here is that of buying and selling slaves, who are stolen from Abyssinia, chiefly by the priests, and sent into Arabia and India.

The next stage was from Dixan to Adowa, capital of the province of Tigré. Leaving Dixan on the 25th of November, they pitched their tent the first night under a large spreading tree called *daroo*, which, Mr Bruce says, was one of the finest he saw in Abyssinia, being about 7½ feet in diameter. They had been joined by some Moors driving 20 loaded asses and two bulls, which in that country are likewise used as beasts of burden. Here, our author says, he recovered a tranquillity of mind which he had not enjoyed since his arrival at Masuah; they were now entirely without the dominions of the naybe, and entered into those of the emperor. Saloome attended them for some way, and seemed disposed to proceed; but one of the company, who belonged to the Abyssinian monarch, having made a mark in the ground with his knife, told him, that if he proceeded one step beyond that, he would bind him hand and foot, and leave him to be devoured by wild beasts.

Being now in a great measure delivered from their fears and embarrassments, the company proceeded on their journey with pleasure, through a much better country than they had hitherto passed. In some places it was covered with wild oats, wood, high bent grass, &c. but in not a few places rocky and uneven. Great flocks of a bird as large as a turkey, called in the Amharic language *erkoom*, were seen in some places. A large animal of the goat kind, called *agazan*, was found dead and newly killed by a lion. It was about the size of a large ass, and afforded a plentiful repast. Numbers of kolquall trees were also seen; and the sides of the river Habesh were adorned with a beautiful tree of the same name with the stream. There were in this place also many flowers of various kinds, particularly jessamine. The mountains of Adowa, which they came in sight of on the 5th of December, are totally unlike any thing to be met with in Europe; their sides being all perpendicular rocks, like steeples or obelisks of many different forms.

Adowa, though the capital of an extensive province or kingdom, does not contain above 300 houses; it occupies nevertheless a large space, by reason of the inclosures of a tree called *wanzey*, which surround each of the houses. It stands on the declivity of a hill, situated on the west side of a small plain surrounded by mountains. It is watered by three rivulets, which never become dry, even in the greatest heats. A manufacture is carried on here of a kind of coarse cotton cloth, which passes for money throughout all Abyssinia. The houses are built of rough stone cemented with mud; lime being only used in the construction of those at Gondar, and even there it is very bad.

Our traveller was very hospitably entertained at Adowa, by one Janni, with whom he resided during his stay there. Leaving it on the 17th of December, he visited the ruins of Axum, once the capital of the empire. He found 40 obelisks, but without any hieroglyphics. A large one is still standing, but the two largest have fallen. There is also a curious obelisk, of which he gives a figure, with other antiquities which our limits will not allow us to enlarge upon. The town has at present about 600 houses, and carries on manufactures of the coarse cotton cloth already mentioned. It is watered by a small stream which flows all the year, and it is received into a fine basin, 150 feet square, where it is collected for the use of the neighbouring gardens. Its latitude was found by Mr Bruce to be 14. 6. 36. N.

On the 20th of January 1770, our traveller set out from Axum. The road was at first smooth and pleasant, but afterwards very difficult; being composed of stones raised one above another, the remains, as he conjectures, of a magnificent causeway. As they passed farther on, however, the air was everywhere perfumed by a vast number of flowers of different kinds, particularly jessamine. One species of this, named *agam*, was found in such plenty, that almost all the adjacent hills were covered by it; the whole country had the most beautiful appearance; the weather was exquisitely fine, and the temperature of the air agreeable. In this fine country, however, Mr Bruce had the first opportunity of beholding the horribly barbarous practice of the Abyssinians, in cutting off pieces of flesh from the bodies of living animals, and devouring them raw; while at the same time they have the utmost horror and religious aversion at pork of every kind: insomuch that Mr Bruce durst not venture to taste the flesh of a wild boar, just after having assisted in the destruction of five or six.

During the remaining part of the journey from Adowa to Siré, the country continued equally beautiful, and the variety of flowers and trees greatly augmented; but as a report was propagated that Ras Michael had been defeated by Fasil, they now met with some insults. These, however, were but trifling; and on the 22d in the evening they arrived safely at Siré, situated in Lat. 14. 4. 35. N.

This town is still larger than Axum, but the houses are built only of clay covered with thatch; the roofs in the form of cones, which indeed is the shape of all those in Abyssinia. Siré stands on the brink of a very steep and narrow valley, through which the road is almost impassable. It is famous for a manufacture of cotton cloth, which, as already observed, passes as money throughout the whole empire. Beads, needles, antimony, and incense sometimes pass in the same way. The country in the neighbourhood is extremely fine; but the inhabitants, from the low situation, are subject to putrid fevers. On leaving it on the 24th, our travellers passed through a vast plain, where they could discern, as far as the eye could reach, only some few detached hills standing on the plain, covered with high grass, which the inhabitants were then burning. The country to the northward is flat and open. In the way to Gondar, however, lies that ridge of mountains called *Samen;* of which one named *Lamalmon* is the most remarkable, and by some supposed to be the highest in Abyssinia. Betwixt Siré and these mountains flows the river Tacazze, which, next to the Nile, is the largest in Abyssinia. Mr Bruce informs us that it carries near one-third of the water which falls on the whole empire; and when passing it he saw the marks of its stream, the preceding year, 18 feet perpendicular above the bottom; nor could it be ascertained whether this was the highest point to which it had reached. The Tacazze has its source in the district of Angot, rising from three sources, like the Nile, in a flat country, about 200 miles to the S. E. of Gondar. It is extremely pleasant, being shaded with fine lofty trees, the water extremely clear, and the banks adorned with the most fragrant flowers. At the ford where they crossed, this river was fully 200 yards broad, and about three feet deep, running very swiftly over a bottom of pebbles. At the very edge of the water the banks were covered with tamarisks, behind which grew tall and stately trees, that never lose their leaves. It abounds with fish, and is inhabited by crocodiles and hippopotami; the former of which frequently carry off people who attempt to cross the river upon blown up skins. The neighbouring woods are full of lions and hyenas. The Tacazze is marked by Mr Bruce in his map as a branch of the Astaboras, which falls into the Nile. The latitude of the ford was found to be 13. 42. 45. N.

This river was passed on the 26th of January; after which our travellers entered into the country of Samen; the governor of which, Ayto Tesfos, had never acknowledged the authority of Ras Michael, nor any of the emperors set up by him since the death of Ioas. The country therefore was hostile; but the uncertainty of the event of the war, and the well-known severity of Michael's disposition, preserved our traveller and his company from any insult, excepting a feeble and unsuccessful attempt to extort money. Here Mr Bruce observes that the people were more flat-nosed than any he had hitherto seen in Abyssinia. The path among the mountains was for the most part exceedingly dangerous, having a precipice of vast height close by it which way soever you turn. The mountains appeared of very extraordinary shapes; some like cones; others high and pointed, like columns, pyramids, or obelisks. In one place a village was observed in so dangerous a situation, that scarce the distance of a yard intervened between the houses and a dreadful precipice. The lions and hyenas were very numerous among these mountains, and devoured one of the best mules our travellers had. The hyenas were so bold, that they stalked about as familiarly as dogs, and were not intimidated by the discharge of fire-arms. Their voracity was such, that they ate the bodies of those of their own species which our travellers had killed in their own defence.

On the 7th of February the travellers began to ascend Lamalmon by a winding path scarcely two feet broad, on the brink of a dreadful precipice, and frequently intersected by the beds of torrents, which produced vast irregular chasms. After ascending two hours with incredible toil up this narrow path, they came to a small plain named *Kedus* or *St Michael*, from a church of that name situated there. On ascending to the very top of the mountain, where they arrived on the 9th of February, our travellers were surprised to find, that though from below it had the appearance of being sharp-pointed, it was in reality a large plain full of springs, which are the sources of most of the rivers in this part of Abyssinia. These springs boil out of the earth, sending forth such quantities of water as are sufficient to turn a mill. A perpetual verdure prevails; and it is entirely owing to indolence in the husbandman if he has not three harvests annually. Lamalmon stands on the north-west part of the mountains of Samen; but though higher than the mountains of Tigré, our author is of opinion that it is considerably inferior to those which are situated on the south-east. The plain on the top is altogether impregnable to an army, both by reason of its situation and the plenty of provisions it affords for the maintenance of its inhabitants; even the streams on the top are full of fish. Here the mercury in the barometer stood at 20⅞ inches.

During the time our travellers remained at Lamalmon, a servant of Ras Michael arrived to conduct them safely to the capital, bringing a certain account of the victory over Fasil; so that now the difficulties and dangers of their journey were over. The country appeared better cultivated as they approached the capital; and they saw several plantations of sugar-canes, which are raised from the seed. In some places, however, particularly in Woggora, great damage is done by swarms of ants, rats, and mice, which destroy the fruits of the earth. Mr Bruce had already experienced the mischief arising from a small species of ant, whose bite was not only more painful than the sting of a scorpion, but which issued out of the ground in such numbers as to cut in pieces the carpets and every thing made of soft materials.

When Mr Bruce approached the capital, he was dressed like a Moor: and this dress he was advised to keep until he should receive some protection from government; his greatest, indeed his only, danger arising from the priests, who were alarmed at hearing of the approach of a Frank to the capital. This was the more necessary, as the emperor and Michael Ras were both out of town. For this reason also he took up his residence in the Moorish quarter of Gondar, a large city, containing not fewer than 3000 houses. The only inconvenience he underwent here, was the not being allowed to eat any flesh: for we have already taken notice of a law made by one of the emperors, that none of his subjects should eat flesh but such as had been killed by Christians; and a deviation from this would have been accounted equal to a renunciation of Christianity itself. Here he remained till the 15th of February; when Ayto Aylo waited upon him, and addressed him in the character of physician, which he had assumed. By this nobleman he was carried to the palace of Koscam, and introduced to the old queen. His advice was required for one of the royal family who was ill of the small-pox; but a saint had already undertaken his cure. The event, however, proved unfortunate; the patient died, and the saint lost his reputation. Our limits will not allow us to give any particular account of the steps by which Mr Bruce arrived at the high degree of reputation which he enjoyed in Abyssinia. In general, his success in the practice of medicine; his skill in horsemanship and the use of fire-arms, which by his own account must have been very extraordinary; his prudence in evading religious disputes; as well as his personal intrepidity and presence of mind, which never once failed him, even in the greatest emergencies; all conspired to render him agreeable to persons of every denomination. By the king he was promoted to the government of Ras-el-Feel, was his constant attendant on all occasions, and was with him in several military expeditions; but never met with any opportunity of distinguishing his personal valour, though he had the command of a body of horse at one of the battles fought at a place named *Serbraxos*. Thus honoured and employed, he had an ample opportunity of exploring the sources and cataracts of the Bahr-el-Azrek, which he considered the Nile, as well as the geography and natural products of the whole country; obtaining also leave at last to return home.

The truth and accuracy of Mr Bruce's narrative have excited greater controversy than has arisen in regard to any other work of the same description. No book ever passed through a severer ordeal; and some have not even scrupled to represent it as a mass of fiction from beginning to end. Such an opinion is now on all hands admitted to be unfounded. There certainly do appear to be some passages that are highly coloured; nor are there wanting a few adventurous sallies, that seem to have but little foundation in reality. But it is no longer doubted that the events of his journey, and his account of the country and people, are in the main correct.

Mr Salt, though he pointedly exposed the mistakes and exaggerations of Mr Bruce, yet bears ample and willing testimony to the general accuracy of his descriptions and narrative; and records, in more than one instance, the astonishment which the Abyssinians expressed at the knowledge which Mr Bruce displayed of their history and country. Mr Browne and Mr Antes, who had excellent opportunities of comparing Mr Bruce's statements with the accounts given by persons well acquainted with Abyssinia, bear testimony to the general accuracy of his details; and Dr Clarke, while at Cairo, obtained from an Abyssinian Dean, whom he met there, direct and specific evidence in favour of the correctness of some parts of his narrative, which had till then been regarded with suspicion. The plates given in Mr Bruce's *Travels*, especially those of natural history, were early represented as inaccurate: and that they may be so in some of the minutiæ is not improbable, as Bruce laid no claim to a scientific knowledge of the subject; but when Dr Clarke showed these plates to the Abyssinian Dean, though he knew not the nature of the book in which they were contained, and the name of Bruce was not mentioned, the latter immediately gave the same appellations, and assigned the same uses as Bruce, to the *Ergett-denimo*, *Eyett el kroné*, *Emsett*, *Kolquall*, *Gergir*, *Kantuffa*, &c. He confirmed the account of the *zimb* fly, and asserted that he had heard of armies being destroyed by it. When Bruce's map was laid before him, though of course he could not read the names, he pointed out the locality of Gondar, exactly where Bruce had placed it.

A considerable period elapsed between the date of Mr Bruce's travels, and those of Mr Salt, the next European traveller in Abyssinia; and Mr Browne informs us, that, for nine years preceding 1796, there was even no communication between Egypt and that country, probably in consequence of the unsettled state of Sennaar and Nubia.

Mr Salt's journeys.

Mr Salt's first journey into Abyssinia took place in the year 1805. Having accompanied Lord Valentia in his travels in the East, and his Lordship being desirous of ascertaining the state of Abyssinia, and the probability of opening a commercial intercourse between it and Britain, and her oriental dominions, Mr Salt undertook the conveyance of some presents from his Lordship to the Ras. An abstract of the most important information contained in both his journeys will afterwards be given; at present we shall confine ourselves to a brief outline of his route. From Massowa he proceeded to Arkeeko; and thence southwards, with a little inclination to the west, he passed over Taranta to Dixan. On leaving this place, he proceeded to Antalo, through Abha, Agowma, and Chelicut. At Antalo he found the Ras, and delivered Lord Valentia's presents. From Antalo he made an excursion to Axum, by the route of Mucullah and Adowa, at which latter place he met with Fasilydas, the son of Yasous, formerly king of Abyssinia. At Axum he particularly examined the obelisks, inscriptions, and ruins; he also discovered a Greek inscription fifteen hundred years old, which proves Axum to have been the capital of a people called the Axumites, and gives credibility to the accounts before doubted, of embassies sent to them by the Romans. This inscription fixes the conquest of part of Arabia by the Abyssinians at an earlier period than was hitherto supposed. From Axum Mr Salt returned to Antalo by the road he came; and on his leaving the country, he again visited Axum and Dixan.

Mr Pearce, one of his attendants, was left behind at Antalo; and when Mr Salt arrived in Abyssinia the second time, about five years afterwards, he learned from Mr Pearce, that during his residence in that country he had made an attempt to reach Gondar. For this purpose he set out from Antalo, and directed his course through the province of Wojjerat, a plain inhabited by negroes called Doba, and a district of the Galla tribe. Soon afterwards he reached the town of Mocurra, and the village of Dufât on one of the high Lasta mountains; his course during the whole of this part of his journey being nearly south. After passing the village of Dufât he arrived at the town of Senare, and visited the sources of the river Tacazze, having before this met with no stream of importance. He now changed his route, following the course of the river, nearly due north, and afterwards north-east to Socota, the reputed capital of Lasta, the district which, before his departure from Antalo, he was advised to pass through, as lying in the most accessible road to Gondar. From Socota he proceeded northwards along the banks of the Tacazze, and, having crossed it, entered the province of Samen, the mountains of which he ascended till he reached Mishekka, and afterwards descended them to Inchetkaab, where Ras Gabriel resided. Here having learned that Ras Welud Selasse, with whom he had been left by Mr Salt at Antalo, was in danger of being attacked by the Galla, he returned to that town by a more direct route than he pursued in his journey to Inchetkaab. His next excursion was, in company with the Ras, against his enemies, through Lasta; and, the Galla having been defeated, he went into the plains of the Edjow. Next year, engaging again in the campaign, he accompanied the army into Hamazen. He also passed over the salt-plain by Amphila. These were the principal parts of Abyssinia which Mr Pearce had an opportunity of visiting, during the interval between Mr Salt's departure from and return to that country.

Mr Salt, in his second journey, proceeded from the coast of the Red Sea, by the route of Wéah, to the foot of the Taranta mountains, which he crossed to Dixan, and thence proceeded to Chelicut. Here he ascertained that it was impracticable to accomplish the immediate object of his journey, the personal delivery of the presents with which he had been intrusted by his Majesty to the emperor of Abyssinia; as that monarch lived entirely neglected, and in fact a prisoner at Gondar, which was in the possession of Guxo, a chief of the Galla, and the decided opponent of Mr Salt's friend, Ras Welud Selasse. Disappointed in this object, he made an excursion to the Tacazze, through the province of Avergale, a distance of sixty miles west from Chelicut; and on his return to the latter town, he made another excursion to Antalo. On finally quitting Chelicut, he passed through the high district of Giralta, whence he descended the steep pass of Atbara, to the banks of the Warre. His route was next to Adowa, over several ridges of hills. From Adowa he made an excursion to Axum, for the purpose of re-examining its ruins and inscriptions. Having accomplished this object, he returned to Adowa, and thence to the sea-coast.

From this brief outline of Mr Salt's two journeys, and of the excursions of Mr Pearce, it will appear that neither of them penetrated so far into Abyssinia as Mr Bruce had done; nevertheless, their narratives are of very considerable value, not only on account of the new information which they supply, but also as they enable us to place more steady confidence in such parts of Mr Bruce's statements regarding Abyssinia as they had the opportunity of verifying; and to ascribe to his *Travels* their just degree of value and accuracy.

The voyage of Hemprich, Ehrenberg, and their companions, of which we have as yet only a rapid sketch from the pen of M. Humboldt, does not promise to throw much light on the civil and interior state of Abyssinia. It appears that they never passed the barrier chain of mountains, but merely explored that north-eastern face which looks to the Red Sea. Their researches and collections relative to the natural history of this region, as well as of Nubia, and the others to which their journey extended, appear to have been very extensive; but the details have not yet been communicated to the public.

Present state of Abyssinia.

It will now be our object to draw, from the narratives of Mr Bruce and Mr Salt, a connected view of the statistics, and of the civil and social condition of this remarkable country.

When Mr Salt was last in Abyssinia, it was divided into three distinct and independent states. Tigré, which was the most powerful, was under the dominion of Ras Welud Selasse, who possessed the monopoly of all the muskets imported, and of all the salt. Tigré comprehends about four degrees of latitude, and the same of longitude; it possesses the sea-coast, is naturally strong, and is inhabited by a warlike people. Its divisions are, 1. Tigré proper; the general character of which is, a range of hills, intersected by deep gullies and cultivated plains. 2. Agamé, which lies to the east of Tigré proper. This division, being level land, at a considerable height above the sea, and consequently enjoying a favourable climate, is rich and fertile. On its eastern frontier, and near the Taltal, it is strong; the salt-plain is in its vicinity. 3. The division of Enderta, to the south of Agamé, is mostly mountainous; its capital is Antalo, in which the Ras resides, on account of its being situated so as to protect the southern provinces from the Galla. 4. To the south of Enderta is the division of Wojjerat; a wild district, full of forests, in which the lion, elephant, and rhinoceros are found. 5. Adjoining to Wojjerat, is the small and low division of Wofila, which borders on the lake Ashangel. Here the Galla are intermixed with the native Abyssinians, and profess the Christian religion. 6. The division of Lasta is rugged, and almost entirely composed of inaccessible mountains. To the north of this there are two mountainous districts; and between them and the Tacazze are two low districts, inhabited by Christian Agows. 7. Farther to the north lies the division of Avergale. It is very narrow, and stretches, for about fifty miles north and south, along the Tacazze. It is inhabited by the Agows. 8. The division of Samen, which is to the east of the Tacazze, is the highest land in Abyssinia. Its mountains run north and south, about eighty miles. 9. Between the northern border of Samen and Tigré proper lies the valuable district of Zemben. 10. Above Zemben, to the west of Axum, is the division of Shiré, the most picturesque part of Abyssinia, abounding in rich valleys, flowery meadows, and shady groves. 11. The last division of Tigré is commonly called the kingdom of the *Baharnegash*.

The *second* independent state is that which still retains the name of Amhara. This is almost entirely in the possession of the Galla, whose chief is Guxo, the enemy of Ras Welud Selasse. His power on the west side of the Tacazze is absolute; and it is much strengthened and increased by his connection with the southern Galla. His cavalry are estimated at twenty thousand, chiefly from the district of Begemder. Gondar belongs to him.

The *third* grand division, which lies in the south of Abyssinia, is now entirely separated from the two others by the Galla: it consists of the united provinces of Shoa and Efat, which are supposed to retain a larger portion of Ethiopian literature and manners than any other part of Abyssinia. Efat lies between the ninth and eleventh degrees of north latitude. It is principally high land, running north and south, and gradually declining on each side into a plain country. Streams flow from both sides of the mountains, and fall into the Nile and Hawush. Two branches of the latter nearly encircle this province. The present ruler is the grandson of Yasous, mentioned by Bruce (but, as Dofter Esther informed Mr Salt, incorrectly) as having visited Gondar while he was there. He resides at Ankober, the capital of Efat. This district is one of the finest in Abyssinia, and in power equal to that of Ras Welud Selasse. Its force is chiefly cavalry, who are very skilful and courageous. The province of Shoa lies on a lower level than that of Efat; there is extremely rich pasturage in its valleys; it contains several large towns, and many monasteries. The district of Walaka and Gondar are dependent on the united provinces of Shoa and Efat.

Of the rivers, the Tacazze rises from three small springs in the plains of Margilla; it is joined by the river Arequa, which runs through the province of Avergale, in a north-west direction, in the district of Zemben; and it forms one of the larger branches of the Nile. The Bahr-el-Azrek, or Blue River, or Azergue, the chief Abyssinian branch of the Nile, rises from two fountains in Sacala, near Geesh, flows through the lake of Dembea, sweeps, after quitting the lake, in a semicircular direction round the provinces of Damot and Gojam, and unites with the Bahr-el-Abiad, or White River, at Wed Hogela, in latitude 16. N. This river the real Nile, is supposed to rise in the Jibbel-el-Kumri, or mountains of the Moon. The other rivers are, the Maleg, which joins the Abyssinian Nile, after a parallel course, on the west; the Mareb, which forms the boundary between Tigré and the kingdom of the Baharnegash; the Hanazo and Hawush, which flow in an opposite direction, towards the entrance of the Red Sea; and the Jemma. The principal lakes are, Dembea, or Tzana, about sixty miles long, and thirty broad, where most extensive, and in the wet seasons; the lake of Lawasa, in the southern extremity of Abyssinia, a chief source of the Hawush; the lake of Haik, near the rocks of Geshen and Ambazel; and the Ashangel.

Productions.

The great difference of climate, owing to the vast extent and variety of elevation in different parts of this empire, is very perceptible in its soil and productions. The mountains in many places are not only barren, but altogether inaccessible, except by those who make it their constant practice to climb amongst them; and even by them they cannot be ascended without great difficulty and danger. The shapes of these mountains, as we have already had occasion to observe, are very strange and fantastical; exceedingly different from those of Europe: some resembling towers and steeples, while others are like a board or slate set up on end; the base being so narrow, and the whole mountain so high and thin, that it seems wonderful how it can stand. In the valleys, however, and flat parts of the country, the soil is excessively fruitful, though in the warmest places grain cannot be brought to perfection. Wine is also made only in one or two places; but the greatest profusion of fruits of all kinds is to be met with everywhere, as well as many vegetables not to be found in other countries. There is a vast variety of flowers, which adorn the banks of the rivers in such a manner as to make them resemble fine gardens. Among these a species of rose is met with, which grows upon trees, and is much superior in fragrance to those which grow on bushes. Senna, cardamom, ginger, and cotton, are likewise produced here in great quantities.

Among the rare plants to be met with in Abyssinia, Mr Bruce particularly describes the following:—1. The papyrus, the ancient material for paper; which our author supposes to have been a native of Ethiopia, and not of Egypt, as has been supposed. 2. Balessan, balm, or balsam plant; a tree growing to the height of 14 or 15 feet, and used for fuel along with other trees in the country. It grows on the coast of the Red Sea, among the myrrh trees behind Azab, all the way to Babelmandel. This is the tree producing the balm of Gilead mentioned in Scripture. 3. The sassa, myrrh, and opocalpasum trees. These grow likewise along the coast of the Red Sea. The sassa or opocalpasum is used in manufactures; and, according to our author, resembles gum *adragant*, probably tragacanth. The tree which produces it grows to a great size, and has a beautiful flower, scarce admitting of description without a drawing. 4. Ensete, an herbaceous plant, growing in Narea, in swampy places; but it is supposed to grow equally well in any other part of the empire, where there is heat and moisture sufficient. It forms a great part of the vegetable food of the Abyssinians. It produces a kind of figs, but these are not eatable. When used for food, it is to be cut immediately above the small detached roots, or perhaps a foot or two higher, according to the age of the plant. The green is to be stripped from the upper part till it becomes white; and when soft, it affords an excellent food when eaten with milk or butter. 5. Rack is a large tree, growing not only in Abyssinia, but in many places of Arabia Felix. Its wood is so hard and bitter, that no worm will touch it; for which reason it is used by the Arabs for constructing their boats. It grows, like the mangrove, among the salt water of the sea, or about salt springs. 6. Cusso, or *Banksia anthelmintica*, is a very beautiful and useful tree, being a strong anthelmintic, and used as such by the Abyssinians. 7. Teff is a kind of grain sown generally throughout Abyssinia, and constituting the bread commonly made use of by the inhabitants. They have indeed plenty of wheat, and are as skilful in forming it into bread as the Europeans; but this is only made use of by people of the first rank: however, the teff is sometimes of such an excellent quality, that the bread made from it is held in equal estimation with the finest wheat. From the bread made of this grain a sourish liquor called *bouza* is prepared, which is used for common drink like our small beer. A liquor of the same kind, but of inferior quality, is made from barley cakes. Some have been of opinion that the use of teff occasions worms; but this is controverted by Mr Bruce. 8. Nook, a plant not to be distinguished from our marigold, either in shape, size, or folinge, is also sown very generally over the country, and furnishes all Abyssinia with oil for the kitchen and other uses.

Our knowledge in this department is considerably increased by Dr Murray's edition of Bruce, and Mr Salt's two journeys. The *lehem*, or *Toberne montana*, a tree common near the lake of Dembea, is remarkable for its beauty and fragrance; it grows to a considerable size, the extremities of its branches trailing along the ground, laden with flowers from top to bottom in great profusion, each cluster containing between eighty-five and ninety, open or shut; the fruit is eaten, but has rather a harsh taste. The *anguah*, found near the Tacazze, produces a gum resembling frankincense. The leaves of the *geesh*, which is very common, are put by the Abyssinians into their maize; they are likewise reduced to powder, and mixed with the other materials of which they make *sowa*. The *mergombey*, a species of *Solanum*, is used as a cathartic; and from the *niche*, or *niege*, they extract their vegetable oil: it is a species of *Sesamum*. These are the principal plants, descriptions and plates of which are given from Mr Bruce's manuscripts and drawings, by Dr Murray. Mr Salt's researches have added eight new genera, and one hundred and twenty-four new species, to botany. Near Shela, a species of narrow-leaved *Ficus* grows, called by the natives *chekunit;* the inner rind of the bark of which, having been bruised on a stone, twisted round a stick, and dried, is used as matches for their fire-arms. Near Adowa, Mr Salt found a new and beautiful species of *Amaryllis*, bearing ten or twelve spikes of bloom on each stem, from one receptacle, as large as those of the *belladonna*. The corolla is white; each petal is marked down the middle with a single streak of bright purple; it is sweet-scented, like the lily of the valley; the bulbs are frequently two feet under ground. Mr Salt brought this plant to England.

The domesticated animals are oxen. The Galla oxen, or *sanga*, were not seen by Mr Bruce; and his account of them is not strictly correct, their large horns not being the effect of disease. The largest Mr Salt ever saw was four feet in length, and the circumference at the base twenty-one inches. The horns of one of them are in the museum of the College of Surgeons in London. The animal itself is of the usual size, and of various colours; it is by no means common in Abyssinia, being brought only by the *cafilas*, or salt caravans, as a valuable present, from the south. The sheep are small and black; the horses strong and beautiful. Besides these, there are mules, asses, a few camels, and two species of dogs; one of which owns no master, but lives in packs in the villages, like the paria dog in India; the other is kept for game, especially for Guinea fowls, which it catches very expertly.

The wild animals are, the elephant, which is hunted by the Shangalla for their teeth: the cawe leopard, only found in the interior districts; very shy; its skin is an article of barter: the two-horned rhinoceros, only found in the forests of Wojjerat, and the low land near the Fungè; its horns have no connection with the bone of the head, consequently the opinion of Sparman, that they can raise and depress them at pleasure, may be correct. This rhinoceros has no folds in the skin, as the one-horned has; its skin is used for shields; its horns for handles to swords and daggers, and, according to the Abyssinian Dean whom Dr Clarke interrogated at Cairo, as a lining to drinking vessels, being regarded as an antidote to poison. The foremost horn is two feet long, and very large in other respects. The buffalo is very common in the forests of Ras-el-fil; shields are made from its skin with great art. The zebra, in the south chiefly; its mane decorates the collars of the war-horses belonging to chiefs of great rank on days of state. The wild ass is found in some parts; lions occasionally, especially in the sandy districts near the Tacazze. Whoever kills one wears the paw on his shield: the skin, richly ornamented, forms a dress like that worn by the Caffre chiefs. There are several species of leopard, one black, extremely rare, the skin of which is worn only by governors of provinces. The lion-cat, tiger-cat, or grey lynx, and wild-cat, are not uncommon. From the libet, civet is procured, and is an article of commerce. The hyena: Mr Salt remarks that it has a singular cry—three distinct deep-toned cries; then silence for a few minutes, succeeded by the same kind of cry. The hyena and dog seldom fight; they even feed on the same carcass. A small kind of wolf; common fox; sea fox; and jackal. There is a great variety of antelopes, one of which is probably allied to the chamois, being confined to the cold and mountainous district of Samen. Several species of monkey; the wild boar; porcupine; cavy, nearly allied to that of the Cape; a small grey hare, deemed by the natives unclean; squirrel; rats, very numerous in the fields; an undescribed species of lemur, the size of a cat, with a long tail, faintly striped with black and white, with white bushy hair at the end: the hair on the body is long, and of a clear white, except on the back, where there is a large oval spot covered with short deep-black hair. Of this every man in Tigré endeavours, if possible, to have a piece on his shield. The hippopotami are chiefly found in the deep pits, like lochs, between the fords of the Tacazze; they roll and snort like a porpus; they cannot remain longer than five or six minutes under water; their colour is a dusky brown, like the elephant; their usual length sixteen feet. Whips are made of their skin, and used to brush away the flies, which are very troublesome in hot weather: the butt-ends of the whips are ornamented with hair from the tail of the camelopard.

The number of birds in this country is immense. Great numbers of eagles, vultures, hawks, and others of that kind, are met with, and come punctually every year after the tropical rains have ceased. They feed at first upon the shell-fish, which are met with in great quantities on the edges of the deserts, where they had lived in the salt springs, but being forced from their natural habitations when these springs were swollen by the rains, are afterwards left to perish on dry land. When these fail, their next resource is from the carcasses of the large animals, such as the elephant and rhinoceros, which are killed in the flat country by the hunters. Their next supply is afforded by the multitude of rats and field-mice which infest the country after harvest. The vast slaughter of cattle made by the Abyssinian armies, the multitude of persons killed, whose bodies are allowed to rot on the field of battle, &c. furnish them also with another resource. These supplies, however, all fail at the beginning of the rainy season, when the hunters and armies return home, and the vast quantity of water which continually overflows the ground renders it impossible for them to find any other food.

The rarest birds brought home by Mr Salt from Abyssinia are, a new species of *Bucco*, since called *B. Saltii*, which clings like the woodpecker to the branches of trees: a variety of the *Upupa erythrorhynchos*, with a black tail; it feeds on the figs of the *Ficus sycamorus*: a non-descript species of *Merops*; a non-descript species of *Tanapa*, which perches on the backs of the cattle, and feeds on the grubs which infest them in hot weather; the *Columba Abyssinica*, wild among the daro trees, eaten by the Abyssinians; the *Tringa Senegalla*; the *Erodia amphilorsis*, allied in some degree to the *Arodea Pondiceriana*, probably a new genus; the *Cursorius Europæus*, an extremely rare bird, shot on the sandy plains near the Tacazze.

Bees are domesticated in the province of Wojjerat, which is famous for white honey, sold at Antalo. Mr Salt gives a dreadful account of the ravages of the Abyssinian locust.

Little is known respecting the mineralogy of Abyssinia. Near Wéah there are low hills of granitic rocks, resting on a bed of micaceous earth. In the district of Tigré the soil is sandy; the rocks, composed of slate, schistus, and granite, lie in perpendicular strata. In the districts of Geralta and Enderta the strata are rather horizontal. But the salt-plain is the most interesting, not only in a mineralogical, but also in an economical view, as from it the Abyssinians obtain the pieces of salt which they use as money. This plain lies near the country of the Assa Durwa, about fifty miles west of Amphila, on the road to Massowa; it is about four days' journey in extent from north-east to south-west, and is crossed in sandals made of the leaves of a species of palm. The plain is perfectly flat; for the first half-mile the salt is soft; it then becomes hard and crystallized, like ice on which snow has fallen after it has been partially thawed: branches of pure salt occasionally rise above the surface. It is cut with an adze into pieces the shape of a whetstone. For about two feet immediately under the surface it is hard and pure; afterwards it is coarse and softer, till exposed to the air. The employment of cutting the salt is very dangerous, on account of the Galla, who frequently attack the workmen: none, therefore, are employed except the lowest order of the natives, who lie down on their backs, or flee to the mountains, on the approach of the Galla. Salt caravans, called *cafilas*, are regularly sent for salt from Antalo; and the situation of Balgudda, or protector of these caravans, is of great importance as well as emolument; for on their safe arrival mainly depends the internal and external commerce of the Abyssinians: when they arrive, therefore, they are received with great acclamation and joy. The Galla frequently attack them. The pay of the Balgudda is derived from the duty imposed on the importation of salt;—a camel, the usual load of which is two hundred pieces, pays eleven; a mule, carrying eighty, pays nine; an ass pays six.

With respect to the climate, Mr Salt found that the thermometer, in March, April, and May, averaged 70° at Chelicut, 65° at Antalo, 95° on the banks of the Tacazze, and on the mountains of Samen he supposed it to be below the freezing point. He contradicts, from his own observation, Mr Bruce's statement, that snow is not known in Abyssinia. The Samen mountains were covered with snow at the time Mr Salt saw them; and Mr Pearce, in his passage over them, experienced a heavy fall.

Agriculture.

Two varieties of wheat are cultivated, of which they make large loaves, either baked or prepared by steam. These, however, are used only at the tables of the great. The teff, which is their usual food, varies in colour from white to black. The Abyssinian Dean informed Dr Clarke that beer, or *sowa*, was made from *selleh*, and not from teff; and that it is not made from the latter, is confirmed by the testimony of Michael, Mr Bruce's servant. (Murray's *Life of Bruce*, 4to. p. 252.) The *neug*, which is like the raggy of India, is next in esteem to the teff, with which, or with barley, it is mixed to make bread. It is harsh and dry. Two kinds of barley are sown; the black in great quantity, but it is only given to horses and mules. Maize is much cultivated between Galla and Dixan, but not made into bread. The vetch is cultivated for the purpose of mixing it with teff, or forming it with ghee and curds into balls. It is eaten in the morning. The worst grain of every kind is generally used for seed. As almost every man cultivates enough for his family, it is seldom sold. On the low lands there are two crops. The ploughs are rudely made, from the root or branch of a tree; sometimes the shares are of iron. They are drawn by oxen. The land is twice ploughed, afterwards the clods are broken by women; and when the corn is half ripe, it is weeded by men, women, and children, singing as they work: only females reap, and when strangers pass they utter a sharp shrill cry, the Liralect of Syria, where it is used on the same occasion. It is produced by trilling the tongue against the roof of the mouth, without any distinct words, but a constant repetition of the syllable *al*, uttered with the utmost rapidity. In some parts the grain, when carried, is secured from the weather by means of tanned kid-skins. The plain of Larai, near Dixan, resembles the vale of Evesham. It is highly cultivated, and irrigation is practised in it. Cotton is grown near the Tacazze, and sold at Adowa.

Customs, &c.

Mr Salt's description of a brind feast, though not so highly coloured as that of Mr Bruce, is still sufficient to prove the barbarism of the Abyssinians. The sides of the table are covered with piles of thin cakes made of teff, reaching to the height of a foot, and two feet and a half in diameter; in the middle a row of curry dishes is placed. Near the Ras there are a number of fine wheaten rolls, for his own use, and that of his favourites. The signal to begin the feast is given by his breaking and distributing them: immediately female slaves, having washed their hands, dip the teff into the curry, and serve it to all the guests, except the Ras, who receives his portion from a male slave, and afterwards distributes it among the chiefs, who acknowledge the favour by standing up and bowing. Balls composed of teff, greens, and curds, are next handed about. In the mean time the process of killing the cattle proceeds in the adjoining yard. That process is simple:—the beast is thrown on the ground, and its head separated from the body with a Jambea knife, during which an invocation is always pronounced. The skin is immediately stript off one side, and the entrails being taken out, are devoured by the attendants. While the fibres are yet quivering, the flesh is cut into large pieces. These are of no regular size; but generally a piece of bone is attached to the flesh, by which it is brought into the dining-room. The chiefs with their crooked knives cut off large steaks, which they divide into long stripes, half an inch in diameter. If they are not pleased with the piece they have got, they hand it to a dependant, who, in his turn, if not pleased, hands it to another, till it comes to one whose taste or rank does not induce or authorize him to reject it. As soon as the first party is satisfied, they rise from the table and give way to others. The last cakes are scrambled for with a great noise. It appears from Mr Salt, that though the chiefs sometimes feed themselves at these feasts, yet more frequently, as Mr Bruce relates, they feed one another.

Mr Pearce witnessed a live meal, when travelling with the Lasta soldiers. Having fasted long, one of them proposed to cut out the *shulada*: a cow was thrown down, and two pieces of flesh, weighing about a pound, cut from the buttock, which they called the *shulada*. Whenever Mr Salt mentioned the term, he was always understood. After the pieces were cut out, the wounds were sewed up, and plastered over with cow-dung. The animal was driven on, but killed at the end of the journey. The Abyssinians are very expert in dissecting a cow, as there are always a number of applicants, each of whom claims a right to a particular portion.

The Abyssinians are very fond of pictures. Their churches are full of them; and such chiefs as can afford it ornament their principal rooms with them. They paint their pictures on the surface of the walls, tracing the outline with charcoal; they afterwards go over it with coarse Indian ink; and lastly, introduce the colours, which are excessively gaudy. They exaggerate the size of the eye, and paint all classes with full faces, except the Jews, whom they uniformly paint with side faces.

On their journeys they sing extemporary verses, one person alone composing and singing them at first, after which they are repeated in chorus by the rest.

Their dress consists of a large folding mantle, and close drawers. To these the priests add a vest of white linen next the skin. On their head they wear a small shawl of white cotton, with the crown exposed. Their houses are of a conic form, covered with thatch. In Dixan the houses are flat-roofed, without windows: instead of chimneys, there are pots of earthen ware on the roofs. There are also caves near this place used as dwellings, which are expeditiously made, in a very simple manner—the earth being dug out, and the mortar tempered occasionally with the blade-bone of an ox, and the stones that are used shaped with an adze.

Their principal liquor is called maize, made of honey fermented with barley, and strengthened with the root of the *Rhamnus inebrians*, called *sadoo*. The liquor is drunk out of Venetian decanters, called *brulhes*. But the common drink among the lower class is made of the bread left at their feasts, and parched barley; it is called *sowa*, and is drunk out of horns.

Marriage is generally a civil contract. The female, who is seldom consulted on the occasion, is carried to the house of her husband on his shoulders, or those of his friends. The bride and bridegroom are sometimes seated on a throne of turf, shaded with boughs, round which the relations, &c. dance. The dowry consists of gold, cattle, muskets, and cloth, and is always kept apart, and returned in case of separation. Marriage by civil contract can be dissolved at pleasure; by religious contract it is more sacred, especially when the parties take the sacrament after marriage. Ladies of rank retain their estates and maiden names, and assume great superiority over their husbands. At Dixan they allow the nails on their left hand to grow to a great length, and cover them with cases of leather to preserve them. In some parts it is not uncommon for one man to have several wives; only one, however, is deemed his lawful wife: each has her separate residence.

When a person is seized with a species of fever called *Tigrè-ter*, his relations show him all the gold and silver ornaments, fine clothes, &c. which they can collect, making, at the same time, a dreadful noise with drums and other musical instruments, to drive the devil out; for they believe all diseases come from the devil. When death is at hand, the drums, &c. cease; and when it actually takes place, howling and tearing the hair and skin from the temples ensue. No time is lost in washing the body and fumigating it with incense, after which it is sewed up in the clothes of the deceased, and buried in great haste. When the burial is over, the *toscar* or feast of the dead commences; an image of the deceased, in rich garments, on his favourite mule, is carried through the town, accompanied by other mules, &c. in gay apparel, and by female hired mourners, crying out, as in Ireland, "Why did you leave us? had you not houses and land?" When the procession returns, cattle are killed, and an immense number of people feasted: a repetition of this feast, at certain intervals, is given by the different relations of the deceased, who vie with one another in profusion and splendour.

When a person is murdered, the criminal is generally given up to the relations of the deceased, who take him to the market-place, and dispatch him with their knives and spears, every relation and friend making a point of striking a blow. When a person accused of any crime is apprehended, he is tied by his garments to another; and it is always considered a sure proof of guilt, if he runs away and leaves his garments behind. The Ras decides disputes; before him each party makes his statement, and stakes a quantity of salt, a mule, slaves, gold, &c. on the veracity of his statement; the party convicted is punished by the forfeiture to the Ras of what he staked. Lands descend from father to son; when there is no son, they go to the brother. All the children and relations have a claim on the property of the deceased; if he has neither, he generally directs it to be sold, and one half to be given to the priests, and the other to the poor.

Their Lent continues fifty-two days, during which they never taste food till after sunset. The chief amusement on the holydays after Lent, among the lower classes, very much resembles the English game of *bandy*.

On the feast of Epiphany, which, according to the Abyssinians, is the 11th of January, they assemble, in commemoration of our Saviour's baptism, near brooks, into which they jump, after having received the blessing of the priest, leaping, dancing, ducking one another, and shouting. In the performance of baptism three priests are engaged; one with the incense, another with a golden cross, and the third with the consecrated oil from the patriarch of Alexandria. The person to be baptized is first washed over with water, and afterwards crossed on the forehead with some of that element, over which the incense has been waved, and into which the consecrated oil has been dropped. When the person is a Mahometan, every joint and limb is crossed with the consecrated oil; he is then wrapped in a white linen cloth, and partakes of the sacrament. No unbaptized person is allowed to enter a church. The sacrament is given in both kinds, with new leavened bread, and wine made of a red grape common in some parts of the country. Great numbers of pilgrims, in a yellow dress, with cords round their waists, resort to the rich and beautiful plains of Walassé, where they spend their time, by no means innocently, amidst its retired groves.

The Christians near Dixan are distinguished by a cross on their breast, arm, &c. and a blue silk string round their neck. They say prayers over whatever they eat, drink, receive, or give, and afterwards blow on it, turning their heads to the east. They turn the heads of animals to the west when they kill them. A striking resemblance may be traced between some of the superstitions of the Abyssinians and those which still linger in our own country. The falcon, called *goodie-goodie*, is never killed by them; and when an Abyssinian sets out on a journey and meets one, he watches it carefully; if it sit still, with its breast towards him till he is past, he regards it as a good omen; if its back is towards him, it is unpropitious; and if it fly away, no motive will induce him to proceed on his journey. It is a prevalent belief, that every worker in iron transforms himself, at night, into an hyena, and preys on human flesh; but if, while thus transformed, he is wounded, the wound remains in the corresponding part of his own body.

The languages spoken in Abyssinia and the neighbouring districts are, a corruption of the Geez, called Tigré, Amharic, Falasha, Gafat, Agow, Tcheretch Agow, Shangalla, and Galla. According to Dr Murray, the written Geez is the oldest dialect of the Arabic in existence. The Amharic, the modern language of Abyssinia, is likewise an Arabic dialect, more simple than the Geez in the form of its verbs, but in all other respects the same. The Falasha is spoken by the tribes professing the Jewish religion, who formerly ruled in Dembea, Samen, and near the Angrab and Kahha; it is one of the ancient Ethiopian tongues, and has no affinity to the Arabic or Hebrew. The language of the Gafat nation is a corrupted dialect of the Amharic.

Respecting the tribes which border upon, or are intermixed with, the Abyssinians, Mr Salt has supplied us with some additional information.

The Jews are very numerous in Gondar and the provinces of Samen and Kuara; they are chiefly employed in building and thatching houses.

The Hazorta tribe inhabit the mountains near Tubbo, and command the only practicable passage into Abyssinia. They are a brave and rude people. Their population is about 5000, over whom there are five chiefs. They possess many cattle, which they seldom kill, but barter with the Abyssinians for grain, being almost entirely ignorant of the art of raising corn. They assist the Abyssinians in getting in their harvests. During the rainy season they go to the sea-side for three, four, or five months, and on their return bring salt, which they exchange for grain with the Abyssinians. When they beat their *tom-toms*, they clap their hands, and hiss in such a manner, that the sound resembles the quick alternate pronunciation of the letters *p t s*. Only one person dances at a time, generally a chief; his feet move little, but his body, and particularly his shoulders, is extremely agitated with a kind of writhing gesture.

The name Shangalla (or, according to Bruce, Shankala) is applied by the Abyssinians to the whole race of negroes. One tribe of them were represented to Mr Salt as living three days' journey beyond the Nile, and as having a very imperfect notion of any supreme being. The only species of adoration which they exhibit occurs during a great holyday, when all the people assemble and kill a cow, by stabbing it in a thousand places. They have no priests or rulers, but pay respect to old age; the old men being allowed to drink first, and take two wives. In their marriages they mutually take each other's sisters. If one of the parties has no sister, he gives one of his female slaves. The women assist the men in ploughing, &c. and have an equal share of the produce of the land. These people are named from some circumstances relating to their birth, as "Born in the night;" or "Born while making *booza;*" or from some marks on their bodies. They are buried in their clothes, without ceremony, the relatives feasting on the cattle of the deceased, his wife getting the household furniture, and the sons his arms, land, and agricultural implements. When hunting, they eat whatever they can procure, even an elephant or a rat. They tie the legs of their prisoners, and employ them in making cloth, or manufacturing iron. Those who cannot work, they kill. The Abyssinians consider it as sport to hunt the Shangalla.

There are at least twenty tribes of the Galla, some of whom, entering Abyssinia from the south, have become naturalized, and adopted the manners of the Abyssinians. The tribes out of Abyssinia have little connection with one another, though they speak the same language; each has its own chief, and they are often engaged in mutual hostilities. There are two divisions larger than the rest, one of which, near the Abiad, or White River, retains its natural ferocity: they drink warm blood, adorn themselves with the entrails of animals, and ride on oxen. The Assubee Galla wear garments like the Abyssinians; grease and powder their hair; and cover their arms with bracelets, and with trophies, according to the number of the enemies slain.

The inhabitants of Hamazen differ from the rest of the Abyssinians, being darker and stronger limbed, and more like the Fungè, who live near Sennaar; they fight desperately with two-edged swords. In the province of Wojjerat, also, the men are larger and stouter than the other Abyssinians. They are said to be the descendants of Portuguese soldiers. Their fidelity to their rulers is proverbial. The plain, eight hours' distance from Wojjerat, is inhabited by the Doba, one of the isolated tribes of negroes found in all parts of Africa. They are mentioned by Alvarez, as, in his time, not marrying till they could make oath that they had put to death twelve Christians.

The Agows, who were worshippers of the Nile till the seventeenth century, always fix their residence near the great branches of that river, for whose waters they still retain a veneration so great, that they will supply a stranger with milk, but not with water. Their buildings are without mortar. The houses of the higher ranks are in the form of Egyptian temples. At the earliest dawn of day they assemble before the doors of their chiefs, and chant their prayers.

Manufactures and commerce.

It has already been mentioned, that one of the objects of Mr Salt's journeys was to ascertain whether Abyssinia was likely to afford any new openings to British commerce. How far this is likely, will best appear from a sketch of the manufactures and commerce of that country. The former are few and contemptible: though cotton grows in many parts, and is of a superior quality, yet they import a considerable quantity from India, which they manufacture into a coarse cloth. As they have no dark blue colour, they unravel the threads of the blue cloth of Surat, and weave them again into their own webs; they procure a black dye from an earth, and red, yellow, and light blue from vegetables. Fine cloth is manufactured at Gondar, and coarse at Adowa; the latter, besides its common use, circulates as money: a coarse piece sixteen cubits long, one and three-fourths wide, is equal to thirty pieces of salt, or one dollar; a piece not so coarse, fifty cubits long, sufficient to make a dress for a chief, is equal to twelve dollars. Coarse carpets, from sheeps' wool, and the hair of goats dyed red and light blue, are manufactured at Gondar and in Samen. In some parts the sheep-skins are tanned, and worn by the women round their waists, or over their shoulders, whenever they stir out. At Axum, skins are made into parchment, and finished well. Manufactures of iron and brass are common; the former is procured from Sennaar, Walkayt, and Berbera: knives are made at Adowa, and spears at Antalo: highly finished chains of brass are made by the Galla. There are many fairs and weekly markets. At a weekly market near Abha, were exposed for sale, iron, wrought and unwrought, for ploughshares, &c. cattle, horses, skins, cotton, ghee, butter in round balls and very white, &c. It is not infamous, as Mr Bruce asserts, for men to attend the markets.

Through Adowa, there are imported for Gondar and the interior of Abyssinia, lead, block-tin, gold-foil, Persian carpets, raw silks from China, velvets, French broad cloths, coloured skins from Egypt, and glass beads and decanters from Venice. Ivory, gold, and slaves, are the principal exports through Adowa to the coast. A few slaves from Abyssinia reach Cairo, by way of Cossir and Suez; they are esteemed more beautiful than those of Soudan.

In estimating the probability that Abyssinia may afford a new opening for British commerce, there are two circumstances which require particular consideration. There can be no doubt, that, in so far as a more accurate knowledge of the navigation of the Red Sea, and convenient places for landing the goods, are requisite for this object, the journeys of Lord Valentia and Mr Salt have been of great utility; but there can be no communication with Gondar and the interior of Abyssinia, unless we could either form an alliance with the chief who commands there,—in which case we should be exposed to the enmity of the Ras of Tigré, and thus be prevented even from advancing to a short distance from the coast,—or assist the Ras to liberate his sovereign, and replace him on his throne. Direct assistance could not be given, and the result seems very doubtful were we only to furnish the Ras with a supply of arms. In the second place, supposing the communication with Gondar to be open and easy, Abyssinia at present can furnish nothing in exchange for our goods. We could indeed supply them, either from Britain or from our Indian possessions, with most of the articles which they procure from Arabia; especially with India goods and raw cotton from India, for which, as cotton is used for clothing in the greater part of Africa, there must be a great demand: besides, our goods could be sold cheaper, being exempt from the heavy duty imposed on what they now import. But for exchange with us, Abyssinia produces only ivory and gold: the latter in small quantities; the former we can procure cheaper elsewhere.

On the whole, therefore, when we consider that the communication with the interior will probably always be liable to interruption; and that, even if the case were otherwise, no returns could be looked for, except from the increased industry and skill of the Abyssinians, or from regions with which the intercourse is slow and precarious; there seems but little reason to expect that this country will afford any new openings to British commerce.

ABYSSINIAN, in *Ecclesiastical History*, is the name of a sect in the Christian church, established in the empire of Abyssinia. The Abyssinians are a branch of the Copts or Jacobites, with whom they agree in admitting but one nature in Jesus Christ, and rejecting the council of Chalcedon: whence they are called *Eutychians* or *Monophysites*, and stand opposed to the Melchites. They are only distinguished from the Copts, and other sects of Jacobites, by some peculiar national usages. The Abyssinian sect or church is governed by a bishop or metropolitan styled *Abuna*, sent them by the Coptic patriarch of Alexandria residing at Cairo, who is the only person that ordains priests. The next dignity is that of Komos, or Hegumenos, who is a kind of archpresbyter. They have canons also, and monks: the former of whom marry; the latter, at their admission, vow celibacy, but with a reservation: these, it is said, make a promise aloud, before their superior, to keep chastity; but add in a low voice, *as you keep it*. The emperor has a kind of supremacy in ecclesiastical matters. He alone takes cognizance of all ecclesiastical causes, except some smaller ones reserved to the judges, and confers all benefices, except that of Abuna.

The Abyssinians have at different times expressed an inclination to be reconciled to the see of Rome; but rather out of interests of state than any other motive. The Emperor David, or the queen regent on his behalf, wrote a letter on this head to Pope Clement VII. full of submission, and demanding a patriarch from Rome to be instructed by; which being complied with, he publicly abjured the doctrine of Eutychius and Dioscorus in 1626, and allowed the supremacy of the pope. Under the emperor Sultan Seghed all was undone again; the Romish missionaries settled there had their churches taken from them, and their new converts banished or put to death. The congregation *de propaganda* have made several attempts to revive the mission, but to little purpose.—The doctrines and ritual of this sect form a strange compound of Judaism, Christianity, and superstition. They practise circumcision, and are said to extend the practice to the females as well as males; they observe both Saturday and Sunday as Sabbaths; they eat no meats prohibited by the law of Moses; women are obliged to the legal purifications; and brothers marry their brothers' wives, &c. On the other hand, they celebrate the Epiphany with peculiar festivity, in memory of Christ's baptism; when they plunge and sport in ponds and rivers; which has occasioned some to affirm that they were baptized anew every year. They have four Lents: the great one commences ten days earlier than ours, and is observed with much severity, many abstaining therein even from fish, because St Paul says there is one kind of flesh of men, and another of fishes. They allow of divorce, which is easily granted among them, and by the civil judge; nor do their civil laws prohibit polygamy itself. They have at least as many miracles and legends of saints as the Romish church; which proved no small embarrassment to the Jesuit missionaries, to whom they produced so many miracles, wrought by their saints, in proof of their religion, and those so well circumstantiated and attested, that the Jesuits were obliged to deny miracles to be any evidence of a true religion; and in proof hereof, to allege the same arguments against the Abyssinians which Protestants in Europe allege against Papists. They pray for the dead, and invoke saints and angels; have so great a veneration for the virgin, that they charge the Jesuits with not rendering her honour enough. They venerate images in painting; but abhor all those in relievo, except the cross. They hold that the soul of man is not created; because, say they, God finished all his works on the sixth day. They admit the apocryphal books, and the canons of the apostles, as well as the apostolical constitutions, for genuine. Their liturgy is given by Alvarez, and in English by Pagit; and their calendar by Ludolph.

ACA, Ace, or Acon, in *Ancient Geography*, a town of Phœnicia, on the Mediterranean; afterwards called *Ptolemais*; now *Acre*.

ACACALOTI, the Brazilian name of a bird called by some *corvus aquaticus*, or the water raven: properly, the pelicanus carbo, or corvorant.

ACACIA, Egyptian Thorn, or Binding Bean-tree, in *Botany*, a species of mimosa, according to Linnæus; though other botanists make it a distinct genus.

The flowers of a species of the acacia are used by the Chinese in making that yellow which we see bears washing in their silks and stuffs, and appears with so much elegance in their painting on paper. The method is this: They gather the flowers before they are fully open; these they put in a clean earthen vessel over a gentle heat, and stir them continually about as they do the tea-leaves, till they become dryish and of a yellow colour; then to half a pound of the flowers they add three spoonfuls of fair water, and after that a little more, till there is just enough to hold the flowers incorporated together; they boil this for some time, and the juice of the flowers mixing with the water, it becomes thick and yellow; they then take it from the fire, and strain it through a piece of coarse silk. To the liquor they add half an ounce of common alum, and an ounce of calcined oyster-shells reduced to a fine powder. All is then well mixed together; and this is the fine lasting yellow they have so long used.

The dyers of large pieces use the flowers and seeds of the acacia for dyeing three different sorts of yellow. They roast the flowers, as before observed; and then mix the seeds with them, which must be gathered for this purpose when fully ripe: by different admixtures of these they give the different shades of colour, only for the deepest of all they add a small quantity of Brazil wood.

Mr Geoffroy attributes the origin of bezoar to the seeds of this plant; which being browsed by certain animals, and vellicating the stomach by their great sourness and astringency, cause a condensation of the juices, till at length they become coated over with a stony matter, which we call Bezoar.

Acacia, in the *Materia Medica*, the inspissated juice of the unripe fruit of the *Mimosa Nilotica*.

The juice is brought to us from Egypt, in roundish masses wrapt up in thin bladders. It is outwardly of a deep brown colour, inclining to black; inwardly of a reddish or yellowish brown; of a firm consistence, but not very dry. It soon softens in the mouth, and discovers a rough, not disagreeable taste, which is followed by a sweetish relish. This inspissated juice entirely dissolves in watery liquors, but is scarce sensibly acted on by rectified spirit.

Acacia is a mild astringent medicine. The Egyptians give it in spitting of blood, in the quantity of a drachm, dissolved in any convenient liquor; and repeat this dose occasionally: they likewise employ it in collyria for strengthening the eyes, and in gargarisms for quinsy. Among us, it is little otherwise used than as an ingredient in mithridate and theriaca, and is rarely met with in the shops. What is usually sold for the Egyptian acacia, is the inspissated juice of unripe sloes; this is harder, heavier, of a darker colour, and somewhat sharper taste, than the true sort. See the next article.

German Acacia, the juice of unripe sloes inspissated nearly to dryness over a gentle fire, care being taken to prevent its burning. It is moderately astringent, similar to the Egyptian acacia, for which it has been commonly substituted in the shops. It is given in fluxes, and other disorders where styptic medicines are indicated, from a scruple to a drachm.

Acacia, among antiquaries, something resembling a roll or bag, seen on models, as in the hands of several consuls and emperors. Some take it to represent a handkerchief rolled up, wherewith they made signals at the games; others, a roll of petitions or memorials; and some, a purple bag full of earth, to remind them of their mortality.

ACACIANS, in ecclesiastical history, the name of several sects of heretics; some of which maintained, that the Son was only a similar, not the same, substance with the Father; and others, that he was not only a distinct but a dissimilar substance. Two of these sects had their denominations from Acacius, bishop of Cæsarea, who lived in the fourth century, and changed his opinions so as, at different times, to be head of both. Another was named from Acacius, patriarch of Constantinople, who lived in the close of the fifth century.

ACACIUS, surnamed Luscus, because he was blind of one eye, was bishop of Cæsarea in Palestine, and succeeded the famous Eusebius: he had a great share in the banishment of Pope Liberius, and bringing Felix to the see of Rome. He gave name to a sect, and died about the year 365. He wrote the life of Eusebius, which is lost, and several other works.

Acacius, *Saint*, bishop of Amida in Mesopotamia, in 420, was distinguished by his piety and charity. He sold the plate belonging to his church, to redeem seven thousand Persian slaves who were perishing with hunger. He gave each of them some money and sent them home. Veranius, their king, was so affected with this noble instance of benevolence, that he desired to see the bishop; and this interview procured a peace between that prince and Theodosius I.

There have been several other eminent persons of the same name; particularly, a martyr under the Emperor Decius; a patriarch of Antioch, who succeeded Basil in 458, and died in 459; a bishop of Miletum in the fifth century; a famous rhetorician in the reign of the Emperor Julian; and a patriarch of Constantinople in the fifth century, who was ambitious to draw the whole power and authority of Rome by degrees to Constantinople, for which he was excommunicated by Pope Felix II. He in his turn passed sentence of excommunication against the pope. Still, however, he held his patriarchate till his death in 488.

ACAD, or Achad, in *Ancient Geography*, the town in which Nimrod reigned, called *Archad* by the Seventy; situated in Babylonia, to the eastward of the Tigris.

ACADEMICS, or Academists, a denomination given to the cultivators of a species of philosophy originally derived from Socrates, and afterwards illustrated and enforced by Plato, who taught in a grove near Athens, consecrated to the memory of Academus, an Athenian hero; from which circumstance this philosophy received the name of *Academical*. Before the days of Plato, philosophy had in a great measure fallen into contempt. The contradictory systems and hypotheses which had successively been advanced were become so numerous, that, from a view of this inconstancy and uncertainty of human opinions, many were led to conclude, that truth lay beyond the reach of our comprehension. Absolute and universal scepticism was the natural consequence of this conclusion. In order to remedy this abuse of philosophy and of the human faculties, Plato laid hold of the principles of the academical philosophy; and, in his Phædo, reasons in the following manner: "If we are unable to discover truth," says he, "it must be owing to two circumstances: either there is no truth in the nature of things; or the mind, from a defect in its powers, is not able to apprehend it. Upon the latter supposition, all the uncertainty and fluctuation in the opinions and judgments of mankind admit of an easy solution: Let us therefore be modest, and ascribe our errors to the real weakness of our own minds, and not to the nature of things themselves. Truth is often difficult of access: in order to come at it, we must proceed with caution and diffidence, carefully examining every step; and, after all our labour, we will frequently find our greatest efforts disappointed, and be obliged to confess our ignorance and weakness."

Labour and caution in the researches, in opposition to rash and hasty decisions, were the distinguishing characteristics of the disciples of the ancient academy. A philosopher possessed of these principles will be slow in his progress, but will seldom fall into errors, or have occasion to alter his opinion after it is once formed. In his essay on the academical or sceptical philosophy, Mr Hume has confounded two very opposite species of philosophy. After the days of Plato, the principles of the first academy were grossly corrupted by Arcesilaus, Carneades, &c. This might lead Mr Hume into the notion, that the *academical* and *sceptical* philosophy were synonymous terms. But no principles can be of a more opposite nature than those which were inculcated by the old academy of Socrates and Plato, and the sceptical notions which were propagated by Arcesilaus, Carneades, and the other disciples of the new academical school.

ACADEMY.

ACADEMY, *ακαδημια, ακαδημεια*, or *εκαδημεια*, (the first two forms being probably derived from *ακος*, *medela*, and *δημος*, *populus*, and the last from *εκας*, *procul* or *seorsim*, and *δημος*, *populus*), a garden, villa, or grove, situated in the Ceramicus, one of the suburbs of Athens, about six stadia, or nearly a Roman mile to the north-west of the city. The common tradition is, that it took its name from one *Academus* or *Ecademus*, the original owner, who was contemporary with Theseus, and made it a kind of gymnasium; and that after his death it retained his name, and was consecrated to his memory. When Castor and Pollux came to Athens to reclaim by force of arms the person of their sister Helena, who, according to the legend, had been carried off by Theseus, and concealed in some obscure retreat by the ravisher, the Athenians declared that they knew not where the lady was to be found; but as this answer was not deemed satisfactory by the warlike brothers, *Academus*, cognisant with the secret, and anxious to avert a contest about so frivolous a subject of dispute, apprized them that she was concealed in the town of Aphidna; which was immediately attacked, taken by assault, and razed to the ground. Grateful for this traditionary service, the Lacedemonians, who worshipped the Dioscuri (Castor and Pollux), spared the house and gardens known by the name of the *Academy*, when they ravaged the suburbs of Athens; and, in consideration of the disclosure just mentioned, they honoured the memory of the original owner, from whom the place took its name.[1] Such is the legend which the Greek writers have transmitted to us. With regard to the spot itself, which afterwards became so famous, in connection with the name of Plato and his philosophical disciples, it appears to have remained almost in a state of nature, covered with stagnant water, and exceedingly insalubrious, until the time of Cimon, when it was drained, planted with alleys of trees, and embellished with groves and with fountains: after which it became the promenade of the most distinguished Athenians, and particularly of the Platonic philosophers, thence called the *Academics*; just as the *Lyceum*, another gymnasium, situated to the south-east of Athens, became the promenade of the Aristotelian sect of philosophers, called also Peripatetics (*a περιπατεω, obambulo*), from the locomotive fashion in which they communicated or discoursed concerning their peculiar doctrines. The Academy formed part of the Ceramicus (a word derived from *κεραμος*, signifying *potter's earth* or *earthen vase*, from its being filled with cinerary urns), and was therefore devoted to purposes of sepulture; it being then the practice to inter in a public garden or grove, as in a sort of elysian field, those who had signalized themselves by rendering important services to their country. Cicero, desirous to revive or preserve the name of the Academy, bestowed it on his villa or country-seat near Puzzuoli, where he loved to converse with his friends on philosophical subjects, and where, also, he composed his *Academical Questions*, his treatise on the *Nature of the Gods*, and his celebrated work on the *Commonwealth*, a considerable portion of which was, several years ago, recovered from rescribed or palimpsest manuscripts, by Signor Angelo Maio, librarian of the Vatican.

ACADEMY, in its generalized acceptation, is employed to signify a society of learned men, established for the improvement of science, literature, or the arts. This term, as we have seen, is one of very high antiquity. It was amidst the umbrageous recesses of the gardens of Academus, so favourable to philosophical meditation, that the divine Plato, surnamed the swan of the Academy, established his school, collected his disciples, and taught his sublime morality; wherefore the sect of this illustrious philosopher was called the Academic, and the philosophers who adopted his doctrines Academics. For a long period, accordingly, this title marked out the disciples of Plato alone; but it came afterwards to be applied to all those who belonged to the different learned or literary societies instituted, under the name of Academies, in imitation of the school of Athens, and in order to extend the boundaries of human knowledge. Of these institutions several were established in Athens itself, but none ever equalled the renown of that founded by Plato; and, in point of fact, they were merely schools where Arcesilaus, Carneades, Philo, Antiochus, and other philosophers of less note, explained the different systems with which each in his turn sought to supersede those of his predecessors, but which have since fallen into the most profound neglect and oblivion.

Ptolemy Soter, having by his victories secured undisturbed possession of the throne of Egypt, and wishing to unite to the title of conqueror the more glorious appellation of patron of learning, founded, under the name of Musæon, the celebrated Academy of Alexandria, and provided it with a collection of books, which formed the nucleus of the Alexandrian library. Here he assembled the most distinguished philosophers and scholars of his time, charging them with the investigation of philosophical truth and the improvement of art; and it was to the care and researches of these eminent men and their successors that the famous library, commenced by Ptolemy, and afterwards so barbarously given up to the flames by the Caliph Omar, was enlarged and improved, until it became the pride of Egypt and the glory of the world. This academy, distinguished alike for its useful labours and its improvements in science, has served as a model to modern academies, both as regards the principles on which it was founded, and the object and end of its institution. It admitted into the number of its associates the poets and philosophers of all countries: persons came from every part of the earth to seek instruction, or to deposit new information in its bosom: and all parties were enriched by the continual interchange of ideas and discoveries. For a long period it was the great centre of knowledge. All the literary treasures, scattered throughout the different countries which the tide of barbarism had overflowed, were there collected together: towards the period when Greece began to decline, the spirit and the genius which once presided in her schools of philosophy were in some degree revived in that of Alexandria; and it shone forth like a resplendent beacon-light in the midst of the surrounding darkness, shooting forth rays which have traversed the long course of ages, and guided the academies of modern times in their researches and investigations.

Rome had no academies. In the eyes of the conquerors and masters of the world, the sciences appeared only a secondary object, and of comparatively little importance This Virgil has admitted in his Æneid, where he says, that in art and in science the Romans must yield the palm to other nations, and content themselves with the glory of conquest, and a knowledge of the means by which it might be secured and maintained.[2] The Latin poets and writers, indeed, were formed by the study of Greek models. But no national establishment fostered their genius and favoured their progress, either under the republic, which despised letters, or under the imperial tyrants, who dreaded them. Augustus himself only patronised and rewarded the poets who flattered him; while Mæcenas, in surrounding himself with assemblages of celebrated writers, thought less of extending the boundaries of learning, than of tasting the pleasures of learned society, and wearing off the fatigues of business amidst the sweets of an intercourse entirely Epicurean, or of enjoyments such as literature alone can afford to men of refined and cultivated minds.

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[1] From certain expressions of Eupolis, and this among others, εν ευσκιοις δρομοισιν Ακαδημου θεου, "in the umbrageous groves of the god Academus," it would appear that this person was accounted not merely a hero, but a sort of divinity. Hence the Academy was consecrated to Bacchus Academus, or to the beneficent sun of the ascending signs; as the Lyceum with its *temenos* or *lucus* was dedicated to Apollo Lycæus (so called from λυκος, a wolf), or to the destroying sun of the descending signs of the zodiac: and hence also these schools were the astronomical symbols or representatives of the celestial houses of the two solstices; the Academy, of the higher, and the Lyceum, of the lower solstice.

[2] Excudent alii spirantia mollius æra,
Credo equidem; vivos ducent de marmore voltus;
Orabunt causas melius, cœlique meatus
Describent radio, et surgentia sidera dicent:
Tu regere imperio populos, Romane, memento;
Hæ tibi erunt artes; pacisque imponere morem,
Parcere subjectis, et debellare superbos.
Æneid. lib. vi. l. 848.

When the darkness which had settled down upon Europe after the fall of the Western Empire began at length to disperse, and when a faint glimmering of light, symptomatic of slowly approaching day, began to flicker and tremble on the dusky brow of the long night of ignorance and barbarism, a passion for instruction became in some measure the mode, and gave birth simultaneously to a multitude of learned associations; and these proceeded at once to the study and improvement of the sciences and arts, long neglected, and almost lost in those very countries where they had formerly been cultivated with the greatest success. The Gauls, however, although partially civilized by the Romans and by Julian the philosopher (vulgarly called the Apostate), had relapsed, under the indolent and imbecile monarchs of the first race, into the most profound ignorance; while the monks, who passed for learned men when they could read, were from policy opposed to the instruction of the people. The spirit of monopoly and exclusion was then, as afterwards, a prominent characteristic of the ecclesiastical system; and the danger of educating the people was as vehemently exaggerated as by certain alarmists of our own day. "The clergy," said Charlemagne, "wish to monopolize all learning, and to continue the sole expounders of the sciences and the laws." Nevertheless this prince, who would have done honour to an age far less barbarous, attempted to resuscitate letters, with which he had some acquaintance; and with this view he, encouraged by the celebrated Alcuin, founded in his palace an academy for promoting the study of grammar, orthography, rhetoric, poetry, history, and the mathematics. This academy was composed of the principal wits of the court, Charlemagne himself being a member. In their academical conferences, every member was to give an account of the ancient authors which he had read; and in order to efface all distinctions of rank among the academicians, he required each of them to choose a name purely literary (as, for example, that of some ancient author or celebrated person of antiquity), which should in no degree serve to recall the birth, station, or dignity of the person assuming it. Accordingly, Egilbert, a young lord, and one of the grandees about the court, modestly took the name of Homer; the archbishop of Mayence called himself Damœtas; Alcuin became Flaccus Albinus; Eginhard, Calliopus; Adelard, abbot of Corbie, Augustin; Theodulph, Pindar; and Charlemagne himself, somewhat forgetful of his own rule, David.[1] Fantastical as all this may appear to us, it was nevertheless productive of good. The nobles, who had been accustomed to value themselves solely on their birth and ancestry, began to acquire a relish for more substantial distinctions, and to feel the force of Charlemagne's remark, that the state was likely to be better served by men who had improved their minds and cultivated their talents, than by those who had no other recommendation than overweening pride and a long pedigree. Hence the academy of Charlemagne soon obtained great celebrity; and although few monuments of its labours remain, yet it unquestionably gave an impulse to learning, diffused a taste for knowledge, and probably laid the first foundations of the French language, which was then a rude idiom, composed of a barbarous mixture of the language of the Goths, of Latin, and of the dialect of Celtic spoken by the ancient Gauls. This idiom the academy subjected to principles, forming it into a regular language, which afterwards became the provençal, or language of romance: and when it had thus, as it were, been licked into shape, Charlemagne proposed to have the hymns, the prayers, and the laws translated into it, for the benefit of the people; a proposal which reflects the greatest honour on his memory. But the clergy resolutely set their faces against an innovation which would have deprived them of part of their influence as the sole expounders both of the civil and the divine laws, and thus in a great measure frustrated the principal object which Charlemagne had in view in founding his academy. Still its labours, though in some respects neutralized by the personal interest of the monks, were not altogether useless, but, on the contrary, were instrumental in diffusing the first gleams of light throughout France, and in preparing it to emerge from a state of barbarism.

In the following century, Alfred, a man worthy of being classed with the first French legislator, founded an *academy* at Oxford, which formed the basis of the University afterwards established there; but this being a school for instruction rather than an institution for exciting emulation among the instructed, it does not, for that reason, fall within the scope of the present article. About the same period the Moors of Spain, celebrated for their gallantry, their chivalrous manners, and their taste for poetry, music, and letters, had also their academies at Granada and Cordoba; but of the precise nature and object of these institutions little or nothing is known. In the year 1325, the *Academy of the Floral Games* was established at Toulouse. This academy is still in existence, and is of course the most ancient establishment of the kind in Europe. The members assumed the somewhat fantastical name of *Maintainers of the Gay Science*; and the prizes which it awarded, consisting of flowers of gold and silver, excited a strong spirit of emulation among the Troubadours of Languedoc and Provence. This society, to which Clemens Isaurus bequeathed the whole of his property, still enjoys a considerable reputation; and many of the young poets of France, who aspire to be one day crowned with the genuine laurels of Parnassus, repair to it, at the commencement of their career, to dispute for the *violet*, the *marigold*, the *amaranth*, and the *eglantine*.

A whole host of academies sprung up in different countries immediately after the revival of letters in the fifteenth century; but it was in Italy that they were most numerous, every city in fact having its own; and they were frequently distinguished by appellations remarkable either for their oddity or extravagance. Thus, Rome had its *Lincei*; Naples, its *Ardenti*; Parma, its *Insensati*; and Genoa, its *Addormentati*;—names which some modern academicians might adopt without the slightest impropriety. Many flourishing academies existed in France before the Revolution, most of them having been established and endowed by the munificence of Louis XIV. In Britain we have but few, and those of the greatest note fall to be classed under a different appellation, namely, SOCIETY, to which the reader is referred.

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[1] Some modern writers have supposed that this assumption of ancient or classical names originated in an ardent admiration of antiquity, blended with the genius of an age essentially pedantic; and thus they have endeavoured to account for Alcuin taking the surname of Horace as a prænomen, and calling himself Flaccus Albinus. But from what is stated in the text, this appears to be a mistake. With regard to the circumstance of Charlemagne taking the name of David, which, as a royal one, appears to have been a contravention of his own rule, it is evident that his choice was determined by his passion for the composition of canticles or psalms, in which he believed himself to be eminently skilful, and also by his decided preference of sacred to profane literature. The emperor, in fact, had great pretensions as a theologian; and on one occasion, when reproaching Reibode, archbishop of Treves, with his admiration of Virgil's poetry, he remarked of himself, that he would much rather possess the spirit of the four evangelists than that of the twelve books of the Æneid.

In giving an account of the principal academies, which is all that this article professes to do, we shall, for the sake of clearness, arrange them under different heads, according to the subjects for the cultivation and improvement of which they were instituted. And we shall commence with

I. *MEDICAL ACADEMIES.* Of this description are, the Academy of the *Naturæ Curiosi* of Germany; that founded at Palermo in 1645; that established at Venice in 1701, which used to meet weekly in a hall near the grand hospital; and an institution which took its rise at Geneva in 1715. The Royal Colleges of Physicians at London and Edinburgh have also been ranked by some in the number of academies, but, in our opinion, erroneously; for they are rather of the nature of corporations, organized with a view to guard the privileges and promote the interests of a particular profession, than academies instituted for facilitating the advancement of medical science. This is the exclusive object of the Royal Medical Society, and other institutions of the same sort; which, however, fall to be treated of under a different head, viz. that of SOCIETY.

The Academy of *Naturæ Curiosi*, called also the *Leopoldine Academy*, was founded in 1662, by J. L. Bauschius, a physician, who, imitating the example of the English, published a general invitation to medical men to communicate all extraordinary cases that occurred in the course of their practice: and, the scheme meeting with success, the institution was regularly organized, and Bauschius elected president. The works of the *Naturæ Curiosi* were at first published separately; but this being attended with considerable inconvenience, a new arrangement was formed, in 1770, for publishing a volume of observations annually. From some cause, however, the first volume did not make its appearance until 1784, when it came forth under the title of *Ephemerides;* and the work was afterwards continued, at irregular intervals, and with some variations in the title. In 1687, the Emperor Leopold took the society under his protection, and granted its members several privileges, the most remarkable of which was, that its presidents should be entitled to enjoy the style and rank of counts palatine of the holy Roman empire; and hence the title of *Leopoldine* which it in consequence assumed. But though it thus acquired a name, it had no local habitation or fixed place of meeting, and no regular assemblies; instead of which there was a kind of bureau or office, first established at Breslau, and afterwards removed to Nuremberg, where letters, observations, and communications from correspondents, were received, and persons properly qualified admitted as members. By its constitution, the Leopoldine Academy consists of a president, two adjuncts or secretaries, and colleagues or members, without any limitation as to numbers. At their admission, the last come under a twofold obligation; first, to choose some subject for discussion out of the animal, vegetable, or mineral kingdom, provided it has not been previously treated of by any colleague of the academy; and, secondly, to apply themselves to furnish materials for the annual *Ephemerides.* Each member also bears about with him the symbol of the academy, consisting of a gold ring, whereon is represented a book open, with an eye on one side, and on the other the academical motto of *Nunquam otiosus.*

II. *CHIRURGICAL ACADEMIES.* An association of this sort was, not many years ago, instituted, by public authority, at Paris; the members of which were not only to publish their own observations and improvements, and those of their correspondents, but also to give an account of the various publications on surgery, and to compose a complete history of the art from the works of all the authors, ancient and modern, who have treated of it. Besides, a question in surgery was to be annually proposed, as the subject of a prize essay, and a gold medal of the value of 200 livres given to the successful competitor.

The *Academy of Surgery* at Vienna was instituted by the present emperor, under the direction of the celebrated Brambella. In it there were at first only two professors; and to their charge the instruction of a hundred and thirty young men was committed, thirty of whom had formerly been surgeons in the army. But latterly the number both of teachers and pupils was considerably increased. Gabrielli was appointed to teach pathology and practice; Boecking, anatomy, physiology, and physics; Streit, medical and pharmaceutical surgery; Hunczowsky, surgical operations, midwifery, and the chirurgia forensis; and Plenk, chemistry and botany. To these was also added Beindel, as prosector and extraordinary professor of surgery and anatomy. Besides this, the emperor provided a large and splendid edifice in Vienna, which affords accommodation both for the teachers, the students, pregnant women, patients for clinical lectures, and servants. For the use of this academy the emperor also purchased a medical library, which is open every day; a complete set of chirurgical instruments; an apparatus for experiments in natural philosophy; a collection of natural history; a number of anatomical and pathological preparations; a collection of preparations in wax, brought from Florence; and a variety of other useful articles. Adjoining to the building, also, there is a good botanical garden. With a view to encourage emulation among the students of this institution, three prize medals, each of the value of 40 florins, are annually bestowed on those who return the best answers to questions proposed the year before. These prizes, however, are not entirely founded by the emperor, but are in part owing to the liberality of Brendellius, formerly protochirurgus at Vienna.

III. *ECCLESIASTICAL ACADEMIES.* Under this head may be mentioned the academy at Bologna in Italy, instituted in 1687, for the purpose of investigating the doctrine, discipline, and history, of each age of the church.

IV. *COSMOGRAPHICAL ACADEMIES;* as that at Venice, called the *Argonauts.* This was instituted at the solicitation of F. Coronelli, for the improvement of geographical knowledge. Its design was to publish exact maps, particular as well as general, both of the celestial and terrestrial sphere, together with geographical, historical, and astronomical descriptions. Each member, in order to defray the expense of such a publication, was to subscribe a proportional sum, for which he was to receive one or more copies of each piece published. To this end three societies were established; one under F. Moro, provincial of the Minorites in Hungary; another under the Abbot Laurence au Ruy Payenne au Marais; and the third under F. Baldigiani, Jesuit, professor of mathematics in the Roman College. The device of this academy is the terraqueous globe, with the motto *Plus ultra;* and at its expense all the globes, maps, and geographical writings of F. Coronelli have been published.

In the year 1799, a *Geographical Academy* was established at Lisbon, principally for the purpose of elucidating the geography of Portugal. By the labours of the members of this academy, an accurate map of the country, which was much wanted, has been completed.

V. *ACADEMIES OF SCIENCE.* These comprehend such as have been erected for improving natural and mathematical knowledge, and are otherwise called *Philosophical* and *Physical Academies*.

The first of these was instituted at Naples, about the year 1560, in the house of Baptista Porta. It was called the Academy *Secretorum Naturæ;* and was succeeded by the Academy of *Lincei*, founded at Rome by Prince Frederic Cesi, towards the end of the same century. This academy was afterwards rendered famous in consequence of the discoveries made by some of its members, among whom, the first place is due to the celebrated Galileo, one of the most illustrious names of which the history of science can boast. Several other academies, instituted about this time, also contributed to the advancement of the sciences; but none of them was in any respect comparable to that of the *Lincei*.

Some years after the death of Torricelli, the *Accademia del Cimento* made its appearance, under the protection of Prince Leopold, afterwards Cardinal de' Medici. Redi was one of its chief members. In so far as regards the studies pursued by the other academicians, a very correct idea of them may be formed from the curious experiments published in 1667, by their secretary Count Laurence Magulotti, under the title of *Saggi di Naturali Experienze;* a copy of which was presented to the Royal Society, translated into English by Mr Waller, and published at London in 4to.

The *Accademia degl' Inquieti*, afterwards incorporated into that of *Della Tracia*, in the same city, followed the example of that of Del Cimento. Some excellent discourses on physical and mathematical subjects, by Geminiano Montenari, one of the chief members, were published in 1667, under the title of *Pensieri Fisico-Matematici*.

The *Academy of Rossano*, in the kingdom of Naples, was originally an academy of belles lettres, founded in 1540, and transformed into an academy of sciences in 1695, at the solicitation of the learned abbot Don Giacinto Gimma; who being made president, under the title of Promoter General of the institution, gave it a new set of regulations. He divided the academicians into the following classes: grammarians, rhetoricians, poets, historians, philosophers, physicians, mathematicians, lawyers, and divines; with a class apart for cardinals and persons of quality. To be admitted a member, it was requisite to have taken a degree in one or other of the faculties. The members were not allowed to take the title of *Academicians* in the title-pages of their works, without a written permission from their president, which was not granted till their works had been examined by the censors of the academy; and this permission was the greatest honour the academy could confer, as they thereby adopted the works thus examined, and became answerable for them against all criticisms that might be made upon them. To this law the president or promoter himself was subject; and no academician was allowed to publish anything against the writings of another without leave obtained from the society.

But Italy boasts of a number of scientific academies besides those above mentioned. The Royal Neapolitan Academy was established in 1779; and the published memoirs contain some valuable researches on mathematical subjects. The Royal Academy of Turin was established by the late king when duke of Savoy. Its memoirs were originally published in Latin, under the title of *Miscellanea Philosophica Mathematica Societatis Privatæ Taurinensis;* and the first volume appeared in 1759. Among the original members of this institution the most celebrated was Lagrange, who burst on the scientific world quite unexpectedly, by the novelty and depth of his papers in the first volume of the transactions. An Academy of Sciences, Belles Lettres, and Arts, was established at Padua by the senate, near the close of the eighteenth century. It is composed of twenty-four pensionaries, twelve free associates, twenty-four pupils, twelve associates belonging to the *ci-devant* Venetian States, and twenty-four foreigners, besides honorary members. It has published several volumes of memoirs in the Italian language. The Academy of Sciences and Belles Lettres of Genoa was established in 1783. It consists of thirty-two members; but their labours have been chiefly directed to poetry, nor are we aware that they have published any memoirs. The Academy of Milan was preceded, and perhaps introduced, by a literary assembly, consisting of ten persons, who published a sheet weekly, containing short remarks on subjects of science, belles lettres, and criticism. This society terminated in 1767. But soon afterwards another was established, the transactions of which, published under the title of *Scelta d' Opuscoli Scientifici*, contain several very interesting papers. The Academy of Sciences at Siena, instituted in 1691, published the first volume of its transactions in 1761, and has since continued them, at long intervals, under the title of *Atti dell' Accademia di Siena*. Between the years 1770 and 1780, M. Lorgna established at Verona an academy of sciences of a novel description. The object of it was to form an association among the principal scientific men in all parts of Italy, for the purpose of publishing their memoirs. The first volume appeared in the year 1782, under the title of *Memorie di Matematica e Fisica della Societa Italiana*. The most celebrated names that appear in this volume are those of Boscovich, the two Fontanas, and Spallanzani. There are also scientific academies at Mantua, Pisa, Pavia, and Modena; but several of these do not publish their transactions.

Towards the beginning of the seventeenth century, F. Mersenne is said to have given the first idea of a philosophical academy in France, by the conferences of naturalists and mathematicians occasionally held at his lodgings. At these Gassendi, Descartes, Hobbes, Roberval, Pascal, Blondel, and other celebrated persons, assisted. F. Mersenne proposed to each certain problems to be examined, or certain experiments to be made, and acted, to use a Gallic idiom, as the centre of re-union. By and by these private assemblies were succeeded by more public ones, formed by M. Montmort, and by Thevenot the celebrated traveller. Nor was this spirit confined to France. Animated by the example which had been set in that country, several Englishmen of learning and distinction instituted a kind of philosophical academy at Oxford towards the close of Cromwell's government; and this, after the Restoration, was erected into a Royal Society. (See SOCIETY.) And the English example, in its turn, re-acted upon France; for, in 1666, Louis XIV., assisted by the counsels of Colbert, founded at Paris

The *Royal Academy of Sciences.* Being desirous of establishing the sciences, arts, and literature upon a solid foundation, Louis, immediately after the peace of the Pyrenees, directed M. Colbert to form a society of men of known abilities and experience in the different branches of knowledge, who should meet together under the king's protection, in order to communicate freely their respective discoveries; and with the view of carrying his design the more effectually into execution, he appropriated a sufficient revenue, not only to defray the charge of experiments, but likewise to afford moderate salaries to the members. The commands of the Grand Monarque were executed with equal zeal and ability by his minister. For having conferred with those who were at that time most celebrated for their learning, M. Colbert resolved to form a society of such persons as were conversant in natural philosophy and mathematics; to join to them persons skilled in history and other branches of erudition; and, lastly, to draw together those who were engaged in the cultivation of what was then called the belles lettres, as well as of grammar, eloquence, and poetry. The geometricians and natural philosophers were ordered to meet on Tuesdays and Saturdays, in a great hall of the king's library, where the books of mathematics and natural philosophy were contained; the learned in history to assemble, on Mondays and Thursdays, in the hall where the books of history were arranged; and the class of belles lettres to meet on Wednesdays and Fridays; while all the different classes were directed to assemble together upon the first Thursday of every month, and by their respective secretaries to make a report of the proceedings of the previous month. In a short time, however, the classes of history and belles lettres were united to the *French Academy*, which was originally instituted for the improvement of the French language; in consequence of which the Royal Academy contained only two classes, viz. that of natural philosophy and that of mathematics.

In the year 1696, the king, by an ordonnance dated the 26th of January, gave this academy a new form, and put it upon a footing still more respectable. By this decree it was provided, that henceforth it should consist of four descriptions of members, viz. honorary, pensionary, associates, and élèves; which last were a kind of pupils or scholars, one of whom was attached to each of the pensionaries. The first class was to contain ten persons, and each of the rest twenty. The honorary academicians were to be all inhabitants of France, the pensionaries were all to reside in Paris, and the élèves were also to live in the capital; but eight of the associates might be chosen from among foreigners. The officers were, a president, named by the king out of the class of honorary academicians, and a secretary and treasurer, who held their offices for life. Of the pensionaries, three were to be geometricians, three astronomers, three mechanicians, three anatomists, three botanists, and the remaining two perpetual secretary and treasurer. Of the twelve associates, two were to apply themselves to geometry, two to botany, and two to chemistry; while the élèves were to devote themselves to the particular branches of science cultivated by the pensionaries to whom they were respectively attached, and not to speak except when called to do so by the president. Clerical persons, whether regular or otherwise, were declared inadmissible, except into the class of honorary academicians; nor could any one be admitted an associate or pensionary unless known by some considerable printed work, some machine, or other discovery. The assemblies were held on Wednesdays and Saturdays, except when either chanced to be a holyday; in which case the meeting was held on the day immediately preceding. To encourage members to pursue their inquiries and researches, the king engaged to pay not only the ordinary pensions, but even to confer extraordinary gratifications according to the degree of merit displayed in their respective performances; and, furthermore, his Majesty became bound, as we have already stated, to defray the whole expense of experiments and other investigations which it might be judged necessary from time to time to institute. Hence, if any member gave in a bill of charges for experiments he had made, or desired the printing of any book, and tendered an account of the disbursements required to effect that object, the money was immediately paid by the king, upon the president's allowing and signing the bill. In like manner, if an anatomist required, we shall say, live tortoises in order to make experiments on the action and functions of the heart, he had only to signify his intention through the president, and as many as he pleased were brought him at the king's charge. The motto of the academy was *Invenit et perficit.*

In the year 1716, the Duke of Orleans, then regent, made an alteration in the constitution of this body, augmenting the number of honorary members and of associates eligible from among foreigners, admitting regular clergy among such associates, and suppressing the class of élèves, the existence of which had been attended with some inconveniences, particularly that of producing too great an inequality among the academicians, and of giving rise to misunderstandings and animosities among the members. At the same time he created two other classes; the one consisting of twelve adjuncts, who, like the associates, were allowed a deliberative voice in matters relative to science; and the other of six free associates, who were not attached to any particular science, nor obliged to pursue any particular work.

From the period of its re-establishment in 1699, this academy was very exact in publishing annually a volume containing either the works of its own members, or such memoirs as had been composed and read to the academy during that year. To each volume was prefixed a history of the academy, or an extract of the memoirs and of the *res gestæ* of the different sittings; and appended to the history were éloges pronounced on such academicians as had died in the course of the year. M. Rouille de Meslay, counsellor to the parliament of Paris, founded two prizes, one of 2500 and the other of 2000 livres; the former for the best work, essay, or treatise, on physical astronomy, and the latter for any treatise or improvement relating to navigation and commerce. But notwithstanding all the advantages which the members of this academy enjoyed, and the great facilities afforded them for the prosecution of their researches, the institution latterly degenerated; in consequence, doubtless, of the perpetual interference of the court in behalf of its favourites, or to effect the exclusion of men of unquestionable merit who had incurred its displeasure. The effect of all this was, that persons of inferior acquirements were frequently admitted, while those of the most distinguished talents and reputation were excluded; and hence it gradually sunk in public estimation, until admission not only ceased to be an honour, but even became a subject of contempt and derision. Hence the well-known lines—

Ci gît Pirot, qui ne fut rien,
Pas même Académicien.

The Revolution swept away the academy amidst the wrecks of the monarchy. It was suppressed by the Convention in the year 1793; and being new-modelled and re-organized upon a better and more efficient plan, it received the name of Institute, an appellation which it still bears, notwithstanding the great political changes which have since taken place. See INSTITUTE.

The French had also considerable academies in most of their great cities. Montpellier, for example, had a royal academy of sciences on nearly the same footing as that at Paris, of which, indeed, it was in some measure the counterpart; Toulouse also had an academy under the denomination of Lanternists; and there were analogous institutions at Nismes, Arles, Lyons, Dijon, Bordeaux, and other places. Of these several, we believe, are still in existence, if not in activity.

The *Royal Academy of Sciences at Berlin* was founded in 1700, by Frederic II. king of Prussia, on the model of the Royal Society of England; excepting that, besides natural knowledge, it likewise comprehended the belles lettres. In 1710, it was ordained that the president should

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be one of the counsellors of state, and nominated by the king. The members were divided into four classes: the first for prosecuting physics, medicine, and chemistry; the second for mathematics, astronomy, and mechanics; the third for the German language and the history of the country; and the fourth for oriental learning, particularly in so far as it concerns the propagation of the gospel among heathen nations. Each class was empowered to elect a director for itself, who should hold his post for life. The members of any of the classes were entitled to free admission into the assemblies of the other classes.

The great promoter of this institution was the celebrated Leibnitz, equally distinguished as a jurist, philologist, linguist, antiquary, mathematician, and philosopher, and who accordingly was chosen the first director. The first volume of their transactions was published in 1710, under the title of *Miscellanea Berolinensia*; and although the institution received but few marks of the royal favour for some time, they continued to publish new volumes in 1723, 1727, 1734, and 1740. But Frederic III., the late king of Prussia, at length imparted new vigour to this academy, by inviting to Berlin such foreigners as were most distinguished for their merit and literature, at the same time that he encouraged his own subjects to prosecute the study and cultivation of the sciences; and thinking that the academy, over which some minister or opulent nobleman had till that time presided, would derive advantage from having a man of letters at its head, he conferred that honour on M. Maupertuis. At the same time he gave a new set of regulations to the academy, and took upon himself the title of its protector.

The effect of these changes, however, it is not necessary to enlarge upon, as innovations still more recent have been introduced, with a view to direct the attention of the members to researches of real utility, to improve the arts, to stimulate national industry, and to purify the different systems of moral and literary education. To attain these ends a directory was chosen, consisting of a president and the four directors of the classes, and two men of business, not members of the academy, though at the same time persons of acknowledged learning; and to the body thus constituted was intrusted the management of the funds, and the conduct of the economical affairs of the institution. The power of choosing members was granted to the academy; but the king reserved to himself the privilege of confirming or annulling their choice, as he might think fit. The public library at Berlin, and the collection of natural curiosities, were united to the academy, and intrusted to its superintendence.

The academicians hold two public assemblies annually; at the latter of which is given, as a prize, a gold medal of fifty ducats value. The subject prescribed for this prize is successively taken from natural philosophy, mathematics, metaphysics, and general erudition.

The *Imperial Academy of Sciences at St Petersburg* was projected by the Czar Peter the Great. That despotic reformer, having in the course of his travels observed the advantage of public societies for the encouragement and promotion of literature, formed the design of founding an academy of sciences at St Petersburg. By the advice of Wolf and Leibnitz, whom he consulted on this occasion, the society was accordingly regulated, and several learned foreigners were invited to become members. Peter himself drew the plan, and signed it on the 10th of February 1724; but he was prevented, by the suddenness of his death, from carrying it into execution. His decease, however, did not prevent its completion; for on the 21st of December 1725, Catharine I. established it according to Peter's plan, and on the 27th of the same month the society assembled for the first time. On the 1st of August 1726, Catharine honoured the meeting with her presence, when Professor Bulfinger, a German naturalist of great eminence, pronounced an oration upon the advances made in the theory of magnetic variations, and also on the progress of research in so far as regarded the discovery of the longitude. A short time afterwards the empress settled a fund of L.4982 *per annum* for the support of the academy; and fifteen members, all eminent for their learning and talents, were admitted and pensioned, under the title of Professors in the various branches of science and literature. The most distinguished of these professors were Nicholas and Daniel Bernoulli, the two De Lisles, Bulfinger, and Wolf.

During the short reign of Peter II. the salaries of the members were discontinued, and the academy utterly neglected by the court; but it was again patronised by the Empress Anne, who even added a seminary for the education of youth, under the superintendence of the professors. Both institutions flourished for some time under the direction of Baron Korf; but upon his death, towards the latter end of Anne's reign, an ignorant person being appointed president, many of the most able members quitted Russia. At the accession of Elizabeth, however, new life and vigour were infused into the academy. The original plan was enlarged and improved; some of the most learned foreigners were again drawn to Petersburg; and, what was considered as a good omen for the literature of Russia, two natives, Lomonosof and Rumovsky, men of genius and abilities, who had prosecuted their studies in foreign universities, were enrolled among its members. Lastly, the annual income was increased to L.10,659, and sundry other advantages were conferred upon the institution.

The late Empress Catharine II., with her usual zeal for promoting the diffusion of knowledge, took this useful society under her immediate protection. She altered the court of directors greatly to the advantage of the whole body, corrected many of its abuses, and infused a new vigour and spirit into their researches. By her Majesty's particular recommendation the most ingenious professors visited the various provinces of her vast dominions; and as the funds of the academy were not sufficient to defray the whole expense of these expeditions, the empress supplied the deficiency by a grant of L.2000, which was renewed as occasion required.

The purpose and object of these travels will appear from the instructions given by the academy to the several persons who engaged in them. They were ordered to institute inquiries respecting the different sorts of earths and waters; the best methods of cultivating barren and desert spots; the local disorders incident to men and animals, together with the most efficacious means of relieving them; the breeding of cattle, particularly of sheep; the rearing of bees and silk-worms; the different places and objects for fishing and hunting; minerals of all kinds; the arts and trades; and the formation of a *Flora Russica*, or collection of indigenous plants. They were particularly instructed to rectify the longitude and latitude of the principal towns; to make astronomical, geographical, and meteorological observations; to trace the courses of the rivers; to construct the most exact charts; and to be very distinct and accurate in remarking and describing the manners and customs of the different races of people, their dresses, languages, antiquities, traditions, history, religion; in a word, to gain every information which might tend to illustrate the real state of the whole Russian empire. More ample instructions cannot well be conceived; and they appear to have been very zealously and faithfully executed. The consequence has been, that perhaps no country can boast, within the space of so few years, such a number of excellent publications on its internal state, its natural productions, its topography, geography, and history, and on the manners, customs, and languages of the different tribes who inhabit it, as have issued from the press of this academy.

The first transactions of this society were published in 1728, and entitled *Commentarii Academiæ Scientiarum Imperialis Petropolitanæ ad annum* 1726, with a dedication to Peter II. The publication was continued under this form until the year 1747, when the transactions were called *Novi Commentarii Academiæ, &c.*; and in 1777, the academy again changed the title into *Acta Academiæ Scientiarum Imperialis Petropolitanæ*, and likewise made some alteration in the arrangement and plan of the work. The papers, which had been hitherto published in the Latin language only, are now written indifferently either in that language or in French; and a preface is added, entitled *Partie Historique*, which contains an account of its proceedings, meetings, the admission of new members, and other remarkable occurrences. Of the *Commentaries*, fourteen volumes were published: the first of the *New Commentaries* made its appearance in 1750, and the twentieth in 1776. Under the new title of *Acta Academiæ*, a number of volumes have been given to the public; and two are printed every year. These transactions abound with ingenious and elaborate disquisitions upon various parts of science and natural history; and it may not be an exaggeration to assert, that no society in Europe has more distinguished itself for the excellence of its publications, particularly in the more abstruse parts of the pure and mixed mathematics.

The academy is still composed, as at first, of fifteen professors, besides the president and director. Each of these professors has a house and an annual stipend from L.200 to L.600. Besides the professors, there are four adjuncts, with pensions, who are present at the sittings of the society, and succeed to the first vacancies. The direction of the academy is generally intrusted to a person of distinction.

The buildings and apparatus of this academy are extraordinary. There is a fine library, consisting of 36,000 curious books and manuscripts; together with an extensive museum, in which the various branches of natural history, &c. are distributed in different apartments. The latter is extremely rich in native productions, having been considerably augmented by the collections made by Pallas, Gmelin, Guldenstaedt, and other professors, during their expeditions through the various parts of the Russian empire. The stuffed animals and birds occupy one apartment. The chamber of rarities, the cabinet of coins, &c. contain innumerable articles of the highest curiosity and value. The motto of the society is exceedingly modest: it consists of only one word, *Paulatim*.

The *Academy of Sciences at Bologna*, called the *Institute of Bologna*, was founded by Count Marsigli in 1712, for the cultivation of physics, mathematics, medicine, chemistry, and natural history. Its history is written by M. de Limiers, from memoirs furnished by the founder himself.

The *Academy of Sciences at Stockholm*, or the *Royal Swedish Academy*, owes its institution to six persons of distinguished learning, amongst whom was the celebrated Linnæus. They originally met on the 2d of June 1739, when they formed a private society, in which some dissertations were read; and in the latter end of the same year their first publication made its appearance. As the meetings continued and the members increased, the society attracted the notice of the king; and, accordingly, on the 31st of March 1741, it was incorporated under the name of the Royal Swedish Academy. Not receiving any pension from the crown, it is merely under the protection of the king, being directed, like our Royal Society, by its own members. It has now, however, a large fund, which has chiefly arisen from legacies and other donations; but a professor of experimental philosophy, and two secretaries, are still the only persons who receive any salaries. Each of the members resident at Stockholm becomes president by rotation, and continues in office during three months. There are two kinds of members, native and foreign; the election of the former description takes place in April, that of the latter in July; and no money is paid at the time of admission. The dissertations read at each meeting are collected and published four times in the year: they are written in the Swedish language, and printed in octavo; and the annual publications make a volume. The first forty volumes, which were completed in 1779, are called the *Old Transactions*; for in the following year the title was changed into that of *New Transactions*. The king is often present at the ordinary meetings, and regularly attends the annual assembly in April for the election of members. Any person who sends a treatise which is thought worthy of being printed, receives the Transactions for that quarter *gratis*; together with a silver medal, which is not esteemed for its value, being worth only three shillings, but for its rarity and the honour conveyed by it. All the papers relating to agriculture are published separately under the title of *Œconomica Acta*. Annual premiums, in money and gold medals, principally for the encouragement of agriculture and inland trade, are also distributed by the academy. The fund for these prizes is supplied by private donations.

The *Royal Academy of Sciences at Copenhagen* owes its institution to the zeal of six individuals, whom Christian VI., in 1742, ordered to arrange his cabinet of medals. These persons were, John Gram, Joachim Frederic Ramus, Christian Louis Scheid, Mark Woldickey, Eric Pontopidan, and Bernard Moelman, who, occasionally meeting for this purpose, extended their designs; associated with them others who were eminent in several branches of science; and forming a kind of literary society, employed themselves in searching into, and explaining the history and antiquities of their country. The Count of Holstein, the first president, warmly patronised this society, and recommended it so strongly to Christian VI. that, in 1743, his Danish majesty took it under his protection, called it the Royal Academy of Sciences, endowed it with a fund, and ordered the members to join to their former pursuits, natural history, physics, and mathematics. In consequence of the royal favour, the members engaged with fresh zeal in their pursuits; and the academy has published fifteen volumes in the Danish language, some of which have been translated into Latin.

The *American Academy of Sciences* was established in 1780, by the council and house of representatives in the province of Massachusetts Bay, for promoting a knowledge of the antiquities of America, and of the natural history of the country; for determining the uses to which its various natural productions might be applied; for encouraging medicinal discoveries, mathematical disquisitions, philosophical inquiries and experiments, astronomical, meteorological, and geographical observations, and improvements in agriculture, manufactures, and commerce; and, in short, for cultivating every art and science which may tend to advance the interest and increase the happiness of the people. The members of this academy can never exceed 200, nor fall below forty.

The *Royal Irish Academy* arose out of a society established at Dublin about the year 1782, and consisting of a number of gentlemen, most of whom belonged to the University. They held weekly meetings, and read essays in turn on various subjects. The members of this society afterwards formed a more extensive plan, and, admitting only such names as might add dignity to their new institution, became the founders of the *Royal Irish Academy;* which professed to unite the advancement of science with the history of mankind and polite literature. The first volume of their transactions for 1787 appeared in 1788, and seven volumes were afterwards published. A society was formed in Dublin, similar to the Royal Society in London, as early as the year 1683; but the distracted state of the country proved unpropitious to the cultivation of philosophy and literature.

The *Academy of Sciences at Manheim* was established by Charles Theodore, Elector Palatine, in the year 1755. The plan of this institution was furnished by Schœpflin, according to which it was divided into two classes, the historical and physical. In 1780, a sub-division of the latter took place, into the physical properly so called, and the meteorological. The meteorological observations are published separately, under the title of *Ephemerides Societatis Meteorologicæ Palatinæ.* The historical and physical memoirs are published under the title of *Acta Academiæ Theodoro-Palatinæ.*

The *Electoral Bavarian Academy of Sciences at Munich* was established in 1759, and publishes its memoirs under the title of *Abhandlungen der Baierischen Akademie.* Soon after the Elector of Bavaria was raised to the rank of King, the Bavarian government, by his orders, directed its attention to a new organization of the Academy of Sciences of Munich. The design of the king was, to render its labours more extensive than those of any similar institution in Europe, by giving to it, under the direction of the ministry, the immediate superintendence over all the establishments for public instruction in the kingdom of Bavaria. The Privy-Councillor Jacobi, a man of most excellent character, and of considerable scientific attainments, was appointed president.

The *Electoral Academy at Erfurt* was established by the Elector of Mentz, in the year 1754. It consists of a protector, president, director, assessors, adjuncts, and associates. Its object is to promote the useful sciences. Their memoirs were originally published in the Latin language, but afterwards in German. The Hessian Academy of Sciences at Giessen publish their transactions under the title of *Acta Philosophico-Medica Academiæ Scientiarum Principalis Hessiacæ.* In the Netherlands there are scientific academies at Flushing and Brussels, both of which have published their transactions.

A branch of the royal family of Portugal established at Lisbon, a number of years ago, a Royal Academy of the sciences, agriculture, arts, commerce, and economy in general. It is divided into three classes; natural science, mathematics, and national literature. It is composed of honorary members, as ministers of state and persons of high rank in Lisbon; foreign members, called *socios veteranos;* and acting members. The total number is sixty, of which twenty-four belong to the last class. They enjoy an allowance from government, which has enabled them to establish an observatory, a museum, a library, and a printing office. Their published transactions consist of *Memorias de Litteratura Portugueza,* and *Memorias Economicas,* besides *Scientific Transactions.* They have also published *Collecçao de Livros ineditos de Historia Portugueza.*

VI. Academies or Schools of Arts. Under this we may mention, first of all, the academy at Petersburg, established by the Empress Elizabeth, at the suggestion of Count Shuvalof, and annexed to the Academy of Sciences. The fund for its support was L.4000 *per annum,* and the foundation admitted forty scholars. The late empress formed it into a separate institution, augmented the annual revenue to L.12,000, and increased the number of scholars to three hundred: she also constructed, for the use and accommodation of the members, a large circular building, which fronts the Neva. The scholars are admitted at the age of six, and continue until they have attained that of eighteen. They are clothed, fed, and lodged, at the expense of the crown; and are all instructed in reading and writing, arithmetic, the French and German languages, and drawing. At the age of fourteen they are at liberty to choose any of the following arts, divided into four classes, viz. first, painting in all its branches, of history, portraits, battles, and landscapes, architecture, mosaic, enamelling, &c.; secondly, engraving on copperplates, seal-cutting, &c.; thirdly, carving on wood, ivory, and amber; fourthly, watch making, turning, instrument making, casting statues in bronze and other metals, imitating gems and medals in paste and other compositions, gilding, and varnishing. Prizes are annually distributed to those who excel in any particular art; and from those who have obtained four prizes, twelve are selected, who are sent abroad at the charge of the crown. A certain sum is paid to defray their travelling expenses; and when they are settled in any town, they receive an annual salary of L.60, which is continued during four years. There is a small assortment of paintings for the use of the scholars; and those who have made great progress are permitted to copy the pictures in the imperial collection. For the purpose of design, there are models in plaster, all done at Rome, of the best antique statues in Italy, and of the same size with the originals, which the artists of the academy were employed to cast in bronze.

The *Royal Academy of Arts in London* was instituted for the encouragement of designing, painting, sculpture, &c. &c. in the year 1768. This academy is under the immediate patronage of the king, and under the direction of forty artists of the first rank in their several professions. It furnishes, in winter, living models of different characters to draw after; and in summer, models of the same kind to paint after. Nine of the ablest academicians are annually elected out of the forty, whose business it is to attend by rotation, to set the figures, to examine the performance of the students, and to give them necessary instructions. There are likewise professors of painting, architecture, anatomy, and perspective, who annually read public lectures on the subjects of their several departments; besides a president, a council, and other officers. The admission to this academy is free to all students properly qualified to reap advantage from the studies cultivated in it; and there is an annual exhibition of paintings, sculptures, and designs, open to all artists of distinguished merit.

The *Academy of Painting and Sculpture at Paris.* This took its rise from the disputes that happened between the master painters and sculptors in the French capital; in consequence of which, MM. le Brun, Sarrazin, Corneille, and others of the king's painters, formed a design of instituting a particular academy; and having presented a petition to the king, obtained an arrêt dated January 20. 1648. In the beginning of 1655, they obtained from Cardinal Mazarin, a brevet, and letters patent, which were registered in parliament; in gratitude for which favour, they chose the cardinal their protector, and made the chancellor their vice-protector. In 1663, they obtained, through M. Colbert, a pension of 4000 livres. The academy consisted of a protector, a vice-protector, a director, a chancellor, four rectors, adjuncts to the rectors, a treasurer, four professors (one of whom was professor of anatomy, and another of geometry), several adjuncts and counsellors, an historiographer, a secretary, and two ushers.

Every day for two hours in the afternoon, the Academy of Painting held a public assembly, to which the painters resorted either to design or to paint, while the sculptors modelled after the naked figure. There were twelve professors, each of whom kept the school for a month; and there was an equal number of adjuncts to supply their places in case of need. The professor upon duty placed the naked figure as he thought proper, and set it in two different attitudes every week. This was what they called *setting the model.* In one week of the month he set two models together, which was called *setting the group.* The paintings and models made after this model, were called *academies*, or *academical figures.* They had likewise a woman who stood as a model in the public school. Three prizes for design were distributed among the élèves or disciples every quarter; and four others, two for painting, and two for sculpture, every year.

There was also an Academy of Painting, Sculpture, &c. at Rome, established by Louis XIV., wherein those who had gained the annual prize at Paris were entitled to be three years entertained at the king's expense, for their further improvement.

In 1778, an Academy of Painting and Sculpture was established at Turin. Their meetings were held in the palace of the king, who distributed prizes among the most successful members. In Milan, an Academy of Architecture was established so early as the year 1380, by Galeas Visconti. About the middle of the last century, an Academy of the Arts was established there, after the example of those at Paris and Rome. The pupils were furnished with originals and models, and prizes were distributed annually. The prize for painting was a gold medal, and no prize was bestowed till all the competing pieces had been subjected to the examination and criticism of competent judges. Before the effects of the French revolution reached Italy, this was one of the best establishments of the kind in that kingdom. In the hall of the academy were some admirable pieces of Correggio, as well as several ancient paintings and statues of great merit; particularly a small bust of Vitellius, and a statue of Agrippina, of most exquisite beauty, though it wants the head and arms. The Academy of the Arts, which had been long established at Florence, but which had fallen into decay, was restored by the late Grand Duke. In it there are halls for naked and plaster figures, for the use of the sculptor and the painter. The hall for plaster figures had models of all the finest statues in Italy, arranged in two lines; but the treasures of this, as well as all the other institutions for the fine arts, were greatly diminished by the rapacity of the French. In the saloon of the Academy of the Arts at Modena, there are many casts of antique statues; but since it was plundered by the French it has dwindled into a petty school for drawings from living models: it contains the skull of Correggio. There is also an Academy of the Fine Arts in Mantua, and another at Venice.

In Madrid, an Academy for Painting, Sculpture, and Architecture, was founded by Philip V. The minister for foreign affairs is president. Prizes are distributed every three years. In Cadiz, a few students are supplied by government with the means of drawing and modelling from figures; and such as are not able to purchase the requisite instruments are provided with them.

An Academy of the Fine Arts was founded at Stockholm in the year 1733 by Count Tessin. In its hall are the ancient figures of plaster presented by Louis XIV. to Charles XI. The works of the students are publicly exhibited, and prizes are distributed annually. Such of them as display distinguished talents obtain pensions from government, to enable them to reside in Italy for some years, for the purposes of investigation and improvement. In this academy there are nine professors, and generally about four hundred students. In the year 1705, an Academy of Painting, Sculpture, and Architecture was established at Vienna, with the view of encouraging and promoting the fine arts.

The *Royal Academy of Music* is a name given in France to the grand opera, which is considered as in some sort a combination of all the liberal arts; painting, music, and the dance forming the principal part of that enchanting spectacle. The opera is of Venetian origin; and the Abbé Perrin, who officiated as master of the ceremonies to Gaston, Duke of Orleans, was the first who introduced it at Paris. He obtained letters patent from the king, dated the 28th June 1669, conferring upon him the privilege of establishing *Operatic Academies in Music and in French Verse* throughout the kingdom. Latterly, the theatre where operas are represented has been denominated the *Théâtre des Arts*; a name which has probably been suggested by the following verses of Voltaire, which convey a just definition of this delightful entertainment:—

> Il faut se rendre à ce palais magique,
> Où les beaux vers, la danse, la musique,
> L'art de tromper les yeux par les couleurs,
> L'art plus heureux de séduire les cœurs,
> De cent plaisirs font un plaisir unique.

The *Academy of Ancient Music* was established in London in 1710, by several persons of distinction, and other amateurs, in conjunction with the most eminent masters of the time, in the view of promoting the study and practice of vocal and instrumental harmony. This institution, which had the advantage of a library, consisting of the most celebrated compositions, both foreign and domestic, in manuscript and in print, and which was aided by the performances of the gentlemen of the chapel royal, and the choir of St Paul's, with the boys belonging to each, continued to flourish for many years. In 1731, a charge of plagiarism brought against Bononcini, a member of the academy, for claiming a madrigal of Lotti of Venice as his own, threatened the existence of the institution. Dr Greene, who had introduced the madrigal into the academy, took part with Bononcini, and withdrew from the society, taking with him the boys of St Paul's. In 1734, Mr Gates, another member of the society, and master of the children of the royal chapel, also retired in disgust; so that the institution was thus deprived of the assistance which the boys afforded it in singing the soprano parts. From this time the academy became a seminary for the instruction of youth in the principles of music and the laws of harmony. Dr Pepusch, who was one of its founders, was active in accomplishing this measure; and by the expedients of educating boys for their purpose, and admitting auditor members, the subsistence of the academy was continued. The *Royal Academy of Music* was formed by the principal nobility and gentry of the kingdom, for the performance of operas, composed by Mr Handel, and conducted by him at the theatre in the Haymarket. The subscription amounted to L.50,000, and the king, besides subscribing L.1000, allowed the society to assume the title of *Royal Academy.* It consisted of a governor, deputy-governor, and twenty directors. A contest between Handel and Senesino, one of the performers, in which the directors took the part of the latter, occasioned the dissolution of the academy, after it had subsisted with reputation for more than nine years.

The *Academy of Architecture* was founded, under Louis XIV., by his celebrated minister Colbert in 1671, and was composed of the most distinguished architects of the time. It was provided, however, that the professor of architecture, and the secretary to the academy, should always be chosen from those architects intrusted with the superintendence of royal edifices; and the title of academician was conferred by brevet. The Academy of Architecture held its sittings every Monday at the Louvre, where it occupied the apartment called the *Queen's Saloon;* but at the commencement of the Revolution it was remodelled, like the Academy of Sciences, and transformed into a school for the cultivation and improvement of the fine arts. This school was divided into two sections, the first of which was devoted to painting and sculpture, and the second to architecture; and these two sections received, by a royal ordonnance of the 11th August 1819, the title of *Royal Academy of the Fine Arts.* The instruction in architecture at this institution consists of lessons given in special courses of lectures by four different professors; first, on the theory of the art; secondly, on its history; thirdly, on the mathematical principles of construction; and, fourthly, on perspective; which last branch is common to both sections. By the munificence of the government, this institution is amply provided with means for supporting the pupils admitted within its walls, as also for affording them every facility in the prosecution of their studies; and with the view of exciting emulation as well as rewarding excellence, a grand prize is annually given.

The *Academy of Dancing* was erected by Louis XIV., and had particular privileges conferred upon it.

VII. *ACADEMIES OF LAW.* Under this head we may mention the famous academy at Berytus, and that of the *Sitientes* at Bologna. We are not aware of any other.

VIII. *ACADEMIES OF HISTORY.* The first of these to which we shall advert, is the *Royal Academy of Portuguese History at Lisbon.* This academy was instituted by King John V. in 1720. It consists of a director, four censors, a secretary, and fifty members, to each of whom is assigned some part of the ecclesiastical or civil history of the nation, which he is required to treat either in Latin or Portuguese. In the church history of each diocese, the prelates, synods, councils, churches, monasteries, academies, persons illustrious for sanctity or learning, and places famous for miracles or relics, must be distinctly related in twelve chapters. The civil history comprises the transactions of the kingdom, from the government of the Romans down to the present time. The members who reside in the country are obliged to make collections and extracts out of all the registers, &c. where they live. Their meetings take place once every fifteen days. A medal was struck by this academy in honour of their prince, on the obverse of which was his effigy, with the inscription *Johannes V. Lusitanorum Rex,* and on the reverse, the same prince represented standing, and raising History, almost prostrate before him, with the legend, *Historia, Resurges.* Underneath are the following words in abbreviature: REGia ACADemia HISToriæ LUSITanæ, INSTITuta VI. Idus Decembris MDCCXX.

An *Academy of History* was some time ago established by some learned men at Tubingen, for publishing the best historical writings, the lives of the chief historians, and compiling new memoirs on any matter of importance connected with either.

About the year 1730, a few individuals in Madrid agreed to assemble at stated periods, for the purpose of preserving and illustrating the historical monuments of Spain. In the year 1738, the rules which they had drawn up were confirmed by a royal cedula of Philip V. This academy consists of twenty-four members. The device is a river at its source; the motto, *In patriam populumque fluit.* It has published editions of Mariana, Sepulveda, Solis, and the ancient Chronicles relative to the affairs of Castile, several of which were never before printed. All the diplomas, charters, &c. belonging to the principal cities in Spain, since the earliest period, are in its possession. It has long been employed in preparing a geographical dictionary of that country.

IX. *ACADEMIES OF ANTIQUITIES;* as that at Cortona in Italy, and that at Upsal in Sweden. The first is designed for the study of Hetrurian antiquities; the other for illustrating the northern languages, and the antiquities of Sweden, in which valuable discoveries have been made by it. The head of the Hetrurian academy is called *Lucomon,* a name by which the ancient governors of the country were distinguished. One of their laws is, to give audience to poets only one day in the year; and another is, to fix their sessions, and impose a tax of a dissertation on each member in his turn.

The *Academy of Medals and Inscriptions at Paris* was set on foot by M. Colbert, under the patronage of Louis XIV. in 1663, for the study and explanation of ancient monuments, and for perpetuating great and memorable events, especially those of the French monarchy, by coins, relievos, inscriptions, &c. The number of members was at first confined to four or five, chosen out of those of the French academy; and they met in the library of M. Colbert, from whom they received his Majesty's orders. Though the days of their meetings were not determined, they generally assembled on Wednesdays, especially in the winter season; but, in 1691, the king having given the inspection of this academy to M. de Pontchartrain, comptroller-general of the finances, he fixed their meetings on Tuesdays and Saturdays. By a new regulation, dated the 16th of July 1701, the academy was composed of ten honorary members; ten associates, each of whom had two declarative voices; ten pensioners; and ten élèves, or pupils. They then met every Tuesday and Wednesday, in one of the halls of the Louvre; and had two public meetings yearly, one the day after Martinmas, and the other the 16th after Easter. The class of élèves was suppressed, and united to the associates. The king nominated their president and vice-president yearly; but their secretary and treasurer were perpetual. The rest were chosen by the members themselves, agreeably to the constitutions on that head given to them. One of the first undertakings of this academy was to compose, by means of medals, a connected history of the principal events of Louis XIV.'s reign. In this design, however, they met with very great difficulties, and consequently it was interrupted for a number of years; but at length it was completed down to the advancement of the Duke of Anjou to the crown of Spain. In this celebrated work, the establishment of the academy itself was not forgotten. The medal on this subject represents Mercury sitting, and writing with an antique stylus on a table of brass; he leans with his left hand upon an urn full of medals, and at his feet are several others placed upon a card. The legend is, *Rerum gestarum fides,* and on the exergue, *Academia Regia Inscriptionum et Numismatum, instituta* MDCLXIII.; signifying, that the Royal Academy of Medals and Inscriptions, founded in 1663, ought to give to future ages a faithful testimony of all great actions. Besides this work, we have several volumes of their memoirs; and their history, written and continued by their secretaries.

Under this class the *Academy of Herculaneum* properly ranks. It was established at Naples about 1755, at which period a museum was formed of the antiquities found at Herculaneum, Pompeii, and other places, by the Marquis Tanucci, who was then minister of state. Its object was to explain the paintings, &c. which were discovered at those places; and for this purpose the members met every fortnight, and at each meeting three paintings were submitted to three academicians, who made their report on them at their next sitting. The first volume of their labours appeared in 1775, and they have been continued under the title of *Antichità di Ercolano*. They contain engravings of the principal paintings, statues, bronzes, marble figures, medals, utensils, &c. with explanations. In the year 1807, an Academy of History and Antiquities, on a new plan, was established at Naples, by Joseph Buonaparte. The number of members was limited to forty; twenty of whom were to be appointed by the king, and these twenty were to present to him, for his choice, three names for each of those wanted to complete the full number. Eight thousand ducats were to be annually allotted for the current expenses, and two thousand for prizes to the authors of four works, which should be deemed by the academy most deserving of such a reward. A grand meeting was to be held every year, when the prizes were to be distributed, and analyses of the works read. The first meeting took place on the 25th of April 1807; but the subsequent changes in the political state of Naples have prevented the full and permanent establishment of this institution. In the same year an academy was established at Florence, for the illustration of Tuscan antiquities, which has published some volumes of memoirs.

In consequence of the attention of several literary men in Paris having been directed to Celtic antiquities, a *Celtic Academy* was established in that city in the year 1807. Its objects were, first, the elucidation of the history, customs, antiquities, manners, and monuments of the Celts, particularly in France; secondly, the etymology of all the European languages, by the aid of the Celto-British, Welsh, and Erse; and, thirdly, researches relating to Druidism. The attention of the members was also particularly called to the history and settlements of the Galatæ in Asia. Lenoir, the keeper of the museum of French monuments, was appointed president. A fasciculus, consisting of 150 or 160 pages, was to be published monthly; and the engravings illustrative of Celtic antiquities were to be under the inspection of Lenoir. The devices are, *Gloriæ Majorum*, and *Sermonem patriam moresque requirit*.

X. *Academies of Belles Lettres* are those wherein eloquence and poetry are chiefly cultivated. These are very numerous in Italy, and were not uncommon in France.

The *Academy of Umidi at Florence* has contributed greatly to the progress of the sciences by the excellent Italian translations executed by some of its members, of the ancient Greek and Latin historians. But their chief attention was directed to Italian poetry, at the same time that they applied themselves to the polishing of their language, which produced the *Academy della Crusca*.

The *Academy of Humourists, Umoristi*, had its origin at Rome in the marriage of Lorenzo Marcini, a Roman gentleman, at which several persons of rank were guests; for it being carnival time, to give the ladies some diversion, they betook themselves to the reciting of verses, sonnets, speeches, first *extempore*, and afterwards premeditately; which gave them the denomination of *Belli Humori*. After some experience, and coming more and more into the taste of these exercises, they resolved to form an academy of belles lettres, and changed the title of *Belli Humori* for that of *Humoristi;* choosing for their device a cloud, which, after being formed of exhalations from the salt waters of the ocean, returns in a gentle sweet shower; with this motto from Lucretius, *Redit agmine dulci*.

In 1690, the *Academy of Arcadi* was established at Rome, for reviving the study of poetry and of the belles lettres. Besides most of the politer wits of both sexes in Italy, this academy comprehended many princes, cardinals, and other ecclesiastics; and, to avoid disputes about pre-eminence, all appeared masked after the manner of Arcadian shepherds. Within ten years from its first establishment, the number of *Academicians* amounted to six hundred. They held assemblies seven times a year in a meadow or grove, or in the gardens of some nobleman of distinction. Six of these meetings were employed in the recitation of poems and verses of the Arcadi residing at Rome, who read their own compositions; except ladies and cardinals, who were allowed to employ others. The seventh meeting was set apart for the compositions of foreign or absent members. This academy is governed by a custos, who represents the whole society, and is chosen every four years, with a power of electing twelve others yearly for his assistance. Under these are two sub-custodes, one vicar or pro-custos, and four deputies or superintendents, annually chosen. The laws of the society are immutable, and bear a near resemblance to the ancient model. There are five modes of electing members. The first is by *acclamation*. This is used when sovereign princes, cardinals, and ambassadors of kings desire to be admitted; and the votes are then given *viva voce*. The second is called *annumeration*. This was introduced in favour of ladies and academical colonies, where the votes are taken privately. The third, *representation*, was established in favour of colonies and universities, where the young gentry are bred, who have each a privilege of recommending one or two members privately to be balloted for. The fourth, *surrogation*, whereby new members are substituted in the room of those dead or expelled. The last, *destination*, whereby, when there is no vacancy of members, persons of poetical merit have the title of Arcadi conferred upon them till such time as a vacancy shall happen. All the members of this body, at their admission, assume new pastoral names, in imitation of the shepherds of Arcadia. The academy has several colonies of Arcadi in different cities of Italy, who are all regulated after the same manner.

XI. *Academies of Languages*, called by some, *Grammatical Academies;* as,

The *Academy della Crusca at Florence*, famous for its vocabulary of the Italian tongue, which was formed in 1582, but scarce heard of before the year 1584, when it became noted for a dispute between Tasso and several of its members. Many authors confound this with the Florentine academy. The discourses which Torricelli, the celebrated disciple of Galileo, delivered in the assemblies, concerning levity, the wind, the power of percussion, mathematics, and military architecture, are a proof that these academies applied themselves to things as well as words.

The *Academy of Fructiferi* had its rise in 1617, at an assembly of several princes and nobility of the country, who met with a design to refine and perfect the German tongue. It flourished long under the direction of princes of the empire, who were always chosen presidents. In 1668, the number of members arose to upwards of nine hundred. It was prior in time to the French academy, which only appeared in 1629, and was not established into an academy before the year 1635. Its history is written in the German tongue, by George Neumarck.

The *French Academy* had its rise from a meeting of men of letters in the house of M. Conrart, in 1629. In 1635, it was erected into an academy by Cardinal Richelieu, for refining and ascertaining the French language and style. The number of its members was limited to forty, out of whom a director, chancellor, and secretary were to be chosen; the two former of whom were to hold their posts for two months; the latter was perpetual. The members of this academy enjoyed several privileges and immunities, among which was that of not being obliged to answer before any court but that of the king's household. They met three times a week in the Louvre. At the breaking up of each meeting forty silver medals were distributed among the members, having on one side the king of France's head, and on the reverse, *Protecteur de l'Académie*, with laurel, and this motto, *A l'Immortalité*. By this distribution, the attendance of the academicians was secured; for those who were present received the surplus intended for the absent. To elect or expel a member, the concurrence of at least eighteen was required; nor could any one be chosen unless he petitioned for it; by which expedient the affront of refusals on the part of persons elected was avoided. Religious persons were not admitted; nor could any nobleman or person of distinction be elected on any other footing than as a man of letters. None could be expelled, except for base and dishonest practices; and there were but two instances of such expulsions, the first of M. Grainer for refusing to return a deposit, the other of the Abbé Furetière for plagiarism. The design of this academy was to give not only rules, but examples, of good writing. They began with making speeches on subjects taken at pleasure, about twenty of which were printed. At their first institution they met with great opposition from the parliament; it being two years before the patents granted by the king could be registered. This institution has been severely satirized, and the style of its compositions has been ridiculed as enervating instead of refining the French language. They were also charged with having surfeited the world by flattery, and exhausted all the topics of panegyric in praise of their founder; it being a duty incumbent on every member, at his admission, to make a speech in praise of the king, the cardinal, the chancellor Seguier, and the person in whose room he is elected. The most remarkable work of this academy is a dictionary of the French tongue; which, after fifty years spent in settling the words and phrases to be used in writing, was at last published in 1694.

An academy similar to the above was founded at Petersburg under the auspices of the Princess Dashkof; and the plan having been approved by the crown, a fund was established for its support. It is attached to the Imperial Academy of Sciences at St Petersburg.

The *Royal Spanish Academy at Madrid* held its first meeting in July 1713, in the palace of its founder, the Duke d'Escalona. It consisted at first of eight academicians, including the duke; to which number fourteen others were afterwards added, the founder being chosen president or director. In 1714, the king granted them the royal confirmation and protection. Their device is a crucible in the middle of the fire, with this motto, *Limpia, Fixa, y da Esplendor*; "It purifies, fixes, and gives brightness." The number of members was limited to twenty-four; the Duke d'Escalona was chosen director for life, but his successors were elected yearly, and the secretary for life. Their object, as marked out by the royal declaration, was to cultivate and improve the national language. They were to begin with choosing carefully such words and phrases as have been used by the best Spanish writers; noting the low, barbarous, or obsolete ones; and composing a dictionary wherein these might be distinguished from the former.

The *Royal Swedish Academy* was founded in the year 1786, for the purpose of purifying and perfecting the Swedish language. A medal is struck by its direction every year in honour of some illustrious Swede. This academy does not publish its transactions.

XII. *Academies of Politics*. Of this description was that at Paris, consisting of six persons, who met at the Louvre, in the chamber where the papers relating to foreign affairs were lodged. But this academy proved of little service, as the kings of France were unwilling to trust any but their ministers with the inspection of foreign affairs.

Academy is a term also applied to those royal collegiate seminaries in which young men are educated for the navy and army. In our country there are three seminaries of this description; the Naval Academy at Portsmouth, the Royal Military Academy at Woolwich, and the Royal Military College at Farnham and Sandhurst. Of these we shall give some account in their order.

I. The *Naval Academy at Portsmouth* was founded by George I. in 1722; but the official warrant for its establishment does not appear to have been issued till the 21st of February 1729. This warrant bears, that the academy was instituted for the education of forty young gentlemen, fifteen of whom were to be sons of commissioned officers in the navy. The commissioner of the navy at Portsmouth was, *ex officio*, to be governor; and there were to be two masters for the instruction of the students in navigation and the sciences introductory or auxiliary to it; besides a master for writing and drawing. The annual expense was about L.1169.

In the year 1773, George III., during a visit he paid to Portsmouth, suggested the extension and improvement of the Naval Academy; but no steps were taken towards this object till the year 1806, when an order in council was issued for a new and enlarged establishment. By this order it was henceforward to be called the *Royal Naval College, at Dock-yard, Portsmouth*, and the following officers were appointed: first, a Governor, who was to be the First Lord of the Admiralty for the time being; and, second, a Lieutenant-Governor and inspector, who was to be a post-captain in the navy. As the course of education which the students were to follow necessarily embraced the mathematical sciences, the order directed that the University of Cambridge should recommend three of its graduates, who were able mathematicians; one of whom, the First Lord of the Admiralty, as governor, was to nominate professor. In order to incite him to the regular and faithful discharge of his duty, he was to receive no fixed salary, but to be paid L.8 annually by each student attending the academy. The next in rank and authority under the professor is the preceptor, or head master, who must be a graduate of one of the universities. He has the control of the students at all hours, and is to instruct them in the classics, moral philosophy, geography, history, and general literature.

The order in council also appointed a writing-master, who, besides giving instructions in his own immediate line, was to prepare the students for the lectures of the professor, by teaching them arithmetic, fractions, algebra, and geometry. There are, besides, masters for drawing, French, dancing, and fencing. The surgeon of the dock-yard gives his professional advice and assistance. The domestic economy of the establishment is intrusted, by the order in council, to a disabled and meritorious half-pay lieutenant.

The peculiar advantages of this academy, however, consist in the practical knowledge which it is intended and calculated to bestow on those who are admitted. For this purpose, the master attendant of the dock-yard gives weekly lessons on the management of ships afloat, in one of the cruising sloops; and likewise lessons in rigging and preparing ships for sea, on board such vessels as are preparing to sail from Portsmouth harbour. Forty-seven lessons are given in each of these branches annually, five weeks being allowed for holydays.

The master shipwright of the dock-yard instructs the students in the principles on which ships of war are built, and in the mode of putting the several parts together; making masts, and all other branches of naval architecture, by attending them one day in the week, during the six summer months, through the dock-yards. The gunner of marine artillery also instructs them in the practical knowledge of gunnery, and in the use of the firelock.

The number of scholars, by the order in council of February 1806, was increased from forty to seventy: of these, thirty might be indiscriminately sons of officers, noblemen, or gentlemen; but forty were invariably to be sons of commissioned officers in the naval service. None are admitted under thirteen, nor above sixteen years of age; and those are preferred to fill vacancies who have been previously at sea, provided they are of the proper age. No student can remain at the academy longer than three years; and the whole period of his residence is to be reckoned as two of the six years which it is necessary for a midshipman to serve before he can obtain a lieutenant's commission. Each student, while actually at the academy, that is, during three hundred and thirty days in the year, receives four shillings daily; out of which he pays L.8 annually to the professor. The annual expense of the establishment, as fixed by the order in council of 1806, is about L.6363.

In order to secure to the country the services of the students in that line for which they have been educated, the parents of all of them, except such as have been previously at sea, grant a bond of L.200, which is forfeited in case they do not enter into the naval service. The first year they are at sea, they are rated as volunteers, on *able seaman's* pay; the second year, they have the rank and pay of midshipmen. They are directed to keep journals, to draw head-lands, &c.; and when the ship comes into port, they are to attend the professor, who is to inspect their journals, and examine them regarding their advancement in the theoretical and practical knowledge of this profession.

This academy, as established by the order in council already mentioned, was confined entirely to the education of young *cadets* for the navy: but in the third report of the commissioners, appointed to inquire into the civil affairs of the navy, laid before Parliament in June 1806, a regular system of education for *shipwrights* was also proposed; and the suggestion was accordingly carried into effect, though not till some years afterwards. The professor of the naval academy is also the instructor of the shipwright apprentices, but his instructions extend only to that class who are to serve on board his Majesty's ships of war. No apprentice can be admitted to the academy under sixteen years of age; and he must be previously examined by the professor, before a committee of the navy board, in arithmetic, the first six books of Euclid, and in French. If the candidate is approved, he must be bound to the resident commissioner of the dock-yard for seven years, six of which he spends at the academy, and one at sea. The salary of the apprentices increases yearly, from L.60 to L.140; out of which they pay L.8 to the professor. The number of these apprentices was originally limited to twenty-five; but latterly, six more have been added. They spend half the day under the professor; and the other half under the master shipwright, in the mould lofts, learning the management of timber, and manual labour in ship-building. Lectures are delivered three times a week, after working hours, on the branches of science connected with naval architecture; and annual examinations take place before the resident commissioner, the master shipwright, and the professor.

Out of the class of shipwright apprentices thus educated, are selected the master measurers, foremen of shipwrights, master boat-builders, master mast-makers, assistants to master ship-builders, mechanists in office of inspector-general of naval works, assistants to surveyors of the navy, master shipwrights, second surveyor of navy, inspector-general of navy works, and first surveyor of navy.

II. The *Royal Military Academy at Woolwich* was established by George II. by warrants dated 30th of April and 18th November 1741, for the purpose of instructing "raw and inexperienced people belonging to the military branch of the ordnance, in the several parts of the mathematics necessary for the service of the artillery, and the business of engineers." We find no further notice respecting this institution till the year 1776, when the number of scholars, then called *cadets*, amounted to forty-eight. In the year 1786, they were increased to sixty; in 1796, to ninety; and in 1798, to one hundred, forty of whom were educated for the service of the East India Company. This number continued till the year 1806, when the establishment was improved and further extended, the number of masters being increased, and the cadets being divided into two bodies. This latter regulation took place in consequence principally of the unhealthy and confined situation of the old buildings in the royal arsenal; new buildings having been erected on Woolwich Common, on the side of Shooter's Hill, in a more open and dry situation. As soon as these were finished, one hundred and twenty-eight cadets were lodged in them; sixty still continuing in the royal arsenal. At this period, there were nine masters of mathematics. In 1810, the cadets for the service of the East India Company were withdrawn from Woolwich; and the extra cadets, who, for want of room, had been sent to Marlow, or to private schools, were taken into the college, under the name of supernumeraries. The establishment at present consists of two hundred cadets, one hundred and twenty-eight of whom are in the new buildings, and seventy-two, including twelve supernumeraries, reside in the arsenal. The number of cadets is not fixed by warrant, but is at the discretion of the master-general of ordnance, who, with the board of ordnance, have the entire superintendence of the institution. The immediate direction, however, is vested in the lieutenant-governor and inspector, who are chosen generally from the artillery or engineers by the master-general of the ordnance. It is the duty of these officers, aided by the assistant inspector, to control the masters and professors, and to see that the cadets are taught the necessary branches of instruction. The professors and masters are appointed on the recommendation of the lieutenant-governor, who, assisted by men of science, previously examines them. One master is appointed for every sixteen cadets. At present there are a professor of fortification, with two assistants; a professor of mathematics, with six masters and assistants; two French masters;

a drawing-master for ground, and an assistant; a drawing-master for figures, and another for landscape; a dancing-master; a fencing-master; two modellers; and a lecturer on chemistry. Lectures are also given on the different branches of natural philosophy. The inferior branches of education are taught at the lower institution in the arsenal, and the higher branches at the buildings on the common.

The young men educated at the Royal Military Academy of Woolwich are the sons of noblemen, gentlemen, or military officers. They are called gentlemen cadets, and cannot be admitted under fourteen, nor above sixteen years of age. They are nominated by the master-general of the ordnance, as governor of the academy; but they must be well grounded in English grammar, arithmetic, and French; and they undergo a previous public examination before the masters of the academy. The cadets educated at Woolwich are considered as the first company of the royal regiment of artillery, of which the master-general of the ordnance is the captain. They are also divided into companies, each company having a captain and two subalterns, as military directors. Each cadet receives 2s. 6d. a day, or L.45. 12s. 6d. a year, which covers all his regular expenses, except keeping up his linen. The annual vacations consist of twelve weeks.

Monthly returns of the studies of the cadets, showing the relative progress of each in every branch, with his particular character subjoined, are sent to the master-general of the ordnance: there are also public examinations before the general officers of the ordnance corps. Commissions are given to the cadets according to the report of their merits and acquirements; they have their choice of entering either into the artillery or engineers. The whole expense to government, of the Royal Military Academy at Woolwich, is at the rate of about L.100 for each cadet.

III. The *Royal Military College*, which is at present established at Farnham, in Surrey, and at Sandhurst, near Bagshot, was originally settled at High Wycombe and Great Marlow. The establishment at High Wycombe commenced in January 1799, at which time there was a superintendent, commandant, two or three professors, and thirty-four students. Next year four more professors were added; and in 1801 it took the name of the *Royal Military College* by warrant of George III. A supreme board of commissioners, to superintend and regulate its concerns, was appointed, consisting of the commander-in-chief, secretary of war, and the heads of the great military departments, with others of high rank in the army; three of whom, including the secretary of war, and the adjutant or quartermaster-general, were to form a board of management. By his Majesty's warrant, dated the 4th of June 1802, another department, called the *Junior Department* of the Royal Military College, was formed; and the objects of this, as well as of the original, or *Senior Department*, were specifically pointed out. A collegiate board was also established, for the internal government of the college, consisting of the governor, lieutenant-governor, and the commandants of the two departments. The last warrant relating to this establishment is dated 27th May 1808. It places both the departments, forming one college, under the command of the governor and lieutenant-governor; it continues the collegiate board; and it vests the appointment of professors and masters, after public notice of vacancies, and the examination of the candidates in the presence of the collegiate board, in the supreme board.

By these warrants it was declared, that the Junior Department of the Institution, which was then at Marlow, was principally intended for those who were destined for the military profession, in order to ground them in the necessary sciences by the time they could hold commissions; and also to afford provision for the orphan sons of meritorious officers, who had fallen or been disabled in the service of their country, or whose pecuniary circumstances rendered them unable to educate their sons properly for a military life. The warrant of 1808 fixed the number of students in the Junior Department at four hundred and twelve, divided into four companies of a hundred and three cadets each. They are admitted upon three different establishments:—1. Orphan sons of officers of the army or navy, who have fallen, died, or been disabled in the service: these are admitted free of expense, except that they are to bring the first suit of uniform on their admission, and to keep up their stock of linen, during their residence at the college. 2. The sons of officers actually serving in the army or navy, who pay a certain sum annually, from L.10 to L.60, according to the rank of their fathers. 3. The sons of noblemen and gentlemen, who pay L.100 *per annum* each.

The military branch of the establishment attached to the Junior Department, consists of a commandant, a major, three captains, an adjutant, and inferior officers.

The studies pursued in this department are, mathematics, natural philosophy, history, geography, fortification, military drawing, landscape drawing, arithmetic, classics, French, German, fencing, and writing. There are seven masters of mathematics, four of fortification, five of military drawing, three of landscape drawing, four of history, geography, and classics, six of French, one of German, and three of fencing. The course for this department lasts from three and a half to four years.

Applications for admission must be made to the commander-in-chief, through the governor of the college, and his Majesty's approbation obtained. Every candidate, previously to admission into the Junior Department, must pass an examination in Latin and English grammar, and in the first four rules of arithmetic; and no candidate can be admitted under thirteen or above fifteen years of age.

Examinations are held monthly, which are conducted by the professors of the Senior Department, for the purpose of ascertaining the progress of each cadet, previously to his removal from one class to another. There are also half-yearly examinations, in presence of the collegiate board, on which occasion one or more members of the supreme board, not being members of the collegiate board, attend. These examinations are held previously to the cadets' receiving commissions from the college; and if they acquit themselves well, they are furnished by the board of commissioners, in whose presence the examination takes place, with certificates of qualification to serve in the army as officers. The third class, or gentlemen cadets, are allowed to purchase commissions at any time during their continuance at the college; but no gentleman cadet can be recommended for a commission by private interest, until he has made a certain progress in his studies.

The Senior Department of the Royal Military College, which was originally established at High Wycombe, is intended for the purpose of instructing officers in the scientific parts of their profession, with a view of enabling them better to discharge their duty when acting in the command of regiments; and, at the same time, of qualifying them for being employed in the quartermaster's and adjutant-general's department. The military branch of the establishment of the Senior Department consists of a commandant and adjutant. The studies pursued are, mathematics in all their various branches, fortification, gunnery, castrametation, military drawing and surveying, the reconnoitring of ground, the disposition and movement of troops under all the various circumstances of defensive and offensive war, rules for estimating the military resources of a country, and the German and French languages. There are six professors in this department; one for mathematics, one for fortification, two for military drawing, one for French, and one for German.

The full complement of the Senior Department consists of thirty students. No officer can be admitted till he has completed the twenty-first year of his age, and actually served with his regiment, as a commissioned officer, three years abroad, or four years at home. Applications for admission must be made to the governor, through the commanding officer of the regiment to which the candidate belongs; and the governor transmits the application to the commander-in-chief, for his Majesty's approbation. Such examination as may be deemed requisite, is required previously to admission. Each student of this department pays into the funds of the college thirty guineas annually; and after a certain period he is obliged to keep a horse, for the purpose of receiving such instruction as is given in the field. There are public examinations half-yearly, conducted on the same principle as the half-yearly examinations of the Junior Department. Such officers as have gone through the regular course of studies, and have passed this examination with credit, receive certificates that they are duly qualified for staff-appointments, signed by the board who examined them, and sealed with the seal of the college.

Officers or students of the first department, non-commissioned officers, and other military persons belonging to the college, as well as the gentlemen cadets of the junior department, are subject to the articles of war; for which reason the latter are placed on the establishment of the army, and receive 2s. 6d. per day. This money contributes towards the expense of their education. The gentlemen cadets wear military uniforms.

The general staff of the college consists of the governor, the lieutenant-governor, the inspector-general of instruction, and the chaplain, who, besides performing divine service, teaches the evidences and principles of Christianity. The rest of the staff are exclusively occupied with the finances of the college.

In 1801, five hundred acres of land were purchased at Sandhurst, near Bagshot; and on this space large and commodious buildings were erected, into which the Junior Department was removed from Great Marlow; but the Senior Department remained at Farnham, which is at no great distance from Sandhurst.

ACADEMY *Figure*, a drawing of a naked man or woman, taken from the life; which is usually done on paper with red or black chalk, and sometimes with pastils or CRAYONS.

ACADIE, or ACADY, in *Geography*, a name formerly given to Nova Scotia, or New Scotland, in America.

ACÆNA, in antiquity, a Grecian measure of length, being a ten feet rod, used in measuring their lands.

ACAMANTIS, the ancient name of the island of Cyprus, taken from one of its promontories situated to the west, and called *Acamas*. Teos in Ionia was also called thus from Acamas the founder.

ACAMAS, son of Theseus, followed the rest of the Grecian princes to the siege of Troy; and was deputed, with Diomedes, to the Trojans, in order to get Helen restored. Laodice, Priam's daughter, fell in love with, and had a son by him, called *Munitus*. He was one of the heroes who concealed themselves in the wooden horse. One of the tribes of Athens was called *Acamantides* from him, by the appointment of the oracle; and he founded a city in Phrygia Major, called *Acamantium*. Homer mentions two other heroes of this name: one a Thracian prince, who came to succour Priam; another a son of Antenor.

ACANGIS, that is, *Ravagers* or *Adventurers;* a name which the Turks give their hussars or light troops, who are generally sent out in detachments to procure intelligence, harass the enemy, or ravage the country.

ACANTHA, in *Botany*, the prickle of any plant: in *Zoology*, a term for the spine or prickly fins of fishes.

ACANTHABOLUS, in *Surgery*, an instrument for pulling thorns, or the like, out of the skin.

ACANTHINE, any thing resembling or belonging to the herb acanthus. Acanthine garments, among the ancients, are said to be made of the down of thistles; others think they were garments embroidered in imitation of the acanthus.

ACANTHROPTERYGIOUS FISHES, a term used by Linnæus and others for those fishes whose back fins are hard, osseous, and prickly.

ACANTHUS, in *Architecture*, an ornament representing the leaves of the Acanthus, used in the capitals of the Corinthian and Composite orders.

ACAPALA, or ACAPULA, a town in the province of Chiapa, in New Spain, which is situated on Tabasco river, about five leagues north-west from Chiapa.

ACAPAM, a town of Asia, on the Euxine Sea.

ACAPULCO, a considerable town and port in Mexico, on a bay of the South Sea, distant from the city of Mexico south-east 210 miles. It has a remarkably fine harbour, from whence a ship annually sails to Manilla in the Philippine islands in Asia; and another returns annually from thence with all the treasures of the East Indies, such as diamonds, rubies, sapphires, and other precious stones; the rich carpets of Persia; the camphire of Borneo; the benjamin and ivory of Pegu and Cambodia; the silks, muslins, and calicoes, of the Mogul's country; the gold dust, tea, china ware, silk, and cabinets, of China and Japan; besides cinnamon, cloves, mace, nutmegs, and pepper; insomuch that this single ship contains more riches than many whole fleets. The goods brought to Acapulco are carried to the city of Mexico by mules and pack-horses. Acapulco is but a small place, containing about 4000 inhabitants, mostly people of colour; who are increased to 9000 by the resort of strangers to the annual fair, held when the Manilla galleon arrives. A wretched fort, with 31 pieces of cannon, defends the harbour, which is equally extensive, safe, and commodious. The basin which constitutes this harbour is surrounded by lofty mountains, which are so dry that they are even destitute of water. The air here is hot, heavy, and unwholesome; to which none can habituate themselves except certain negroes that are born under a similar climate, or some mulattoes. Upon the arrival of the galleons, traders flock hither from all the provinces of Mexico. The value of the precious metals exported in the galleon amounts in general to about L.200,000 or L.250,000, the value of the goods to about L.300,000 or L.400,000, according to Humboldt. Long. 99. 46. W. Lat. 16. 50. N.

ACARAI, a town of Paraguay in South America, built by the Jesuits in 1624.

ACARAUNA, a small American fish, called by our sailors *the old wife*.

ACARNANIA, a country of Free Greece, or Greece Proper, bounded on the north by the Sinus Ambracius, and separated from Ætolia by the river Achelous on the east, and on the west by the Ionian Sea. This country was famous for an excellent breed of horses; so that Ακαρνανικος ιππος is a proverbial saying for any thing excellent in its kind. It now forms the western part of Livadia.

ACARON, or Accaron, a town of Palestine, called *Ekron* in Scripture. It was the boundary of the Philistines to the north; stood at some distance from the sea, near Bethshemesh; and was famous for the idol of Baalzebub.

ACASTUS, in classic history, the son of Pelias, king of Thessaly, and one of the most famous hunters of the time, married Hippolita, who falling desperately in love with Peleus her son-in-law, and he refusing to gratify her wishes, she accused him to her husband of a rape; on which he slew them both.

ACATALECTIC, a term in ancient poetry for such verses as have all their feet or syllables, in contradistinction to those that have a syllable too few. The first verse of the two following from Horace is *acatalectic* or complete, the last *catalectic* or deficient.

> Solvitur acris hiems grata vice veris et Favoni,
> Trahuntque siccas machinæ carinas.

ACATALEPSY signifies the impossibility of comprehending something. The distinguishing tenet of the Pyrrhonists was their asserting an absolute acatalepsy in regard to every thing.

ACATERY, or Accatry, anciently an officer of the king's household, designed for a check betwixt the clerks of the kitchen and the purveyors.

ACATHARSIA, in *Medicine*, an impurity of the blood or humours.

ACATHISTUS, the name of a solemn hymn or vigil, anciently sung in the Greek church on the Saturday of the fifth week of Lent, in honour of the Virgin, for having thrice delivered Constantinople from the invasions of the barbarous nations. It was denominated ακαθιστος, *i. e. without sitting*, because, in the celebration of the praises of the Virgin, the people stood all night singing.

ACATIUM, in *Ancient Navigation*, a kind of boat or pinnace used for military purposes. The *acatium* was a species of those vessels called *naves actuariæ*, *i. e.* such as were wrought with oars. It was sometimes made use of in battle. Strabo describes it as a privateer or pirate sloop, and Suidas as a fishing vessel.

ACAULIS, in *Botany*, a term applied to certain plants, the flowers of which have no pedicle or stalk to support them, but rest immediately on the ground, such as the carline thistle, &c.

ACCA, Saint, bishop of Hagustaldt, or Hexham, in Northumberland, succeeded Wilfrid in that see in 709. He ornamented his cathedral in a most magnificent manner; furnished it with plate and holy vestments; and erected a noble library, consisting chiefly of ecclesiastical learning, and a large collection of the lives of the saints, which he was at great pains to procure. He was accounted a very able divine, and was famous for his skill in church music. He wrote several books, particularly *Passiones Sanctorum*, and *Pro illustrandis Scripturis, ad Bedam*. He died in 740, having enjoyed the see of Hexham 31 years, under Egbert king of the Northumbrians.

ACCALIA, in Roman antiquity, solemn festivals held in honour of Acca Laurentia, Romulus's nurse: they were otherwise called Laurentalia.

ACCAPITARE, in *Law*, the act of becoming vassal of a lord, or of yielding him homage and obedience. Hence,

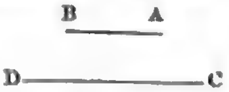
ACCAPITUM signifies the money paid by a vassal upon his admission to a feu.

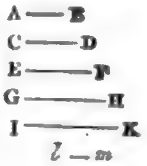
Accapitum, in our *Ancient Law*, was used also to express the relief or fee payable on the entry of an heir to the chief lord.

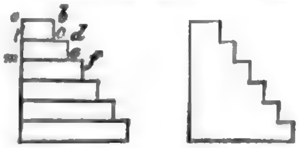
ACCEDAS ad curiam, in *English Law*, a writ used where a man has received, or fears, false judgment in an inferior court. It lies also for justice delayed, and is a species of the writ Recordare.

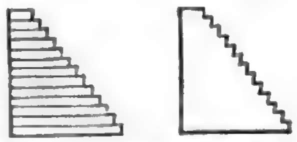
ACCELERATION, in *Natural Philosophy*, denotes generally an increase of motion or velocity, and is chiefly applied to the motion of such bodies as go on, not with a uniform motion, but one which becomes continually quicker and quicker as they advance. A body, for example, rolling down a hill proceeds slowly at first, but gradually increases as it descends, until at last it acquires a velocity and momentum which bears down every thing before it. The same thing takes place when a body is dropped, and allowed to fall freely in the air; although the acceleration is here less observable, on account of the great rapidity of the descent. The earth, in its annual motion round the sun, is subject to a continued acceleration from the apogee to the perigee, while from thence again it suffers a similar retardation. Many other examples occur of such acceleration; but the most interesting is the Acceleration of Falling Bodies. That such an acceleration does take place, is obvious from many circumstances, particularly the increasing momentum which a body acquires in proportion to the height of its descent. But it was only by considering the cause of the descent that the true law of the acceleration was determined. This great discovery we owe to the genius of Galileo. Various theories had been framed by philosophers to account for the accelerated descent of falling bodies, but all of them inconclusive and visionary. Some, for instance, ascribed it to the weight of the pure air above increasing as the body descended. The followers of Gassendi pretended that there are continually issuing out of the earth certain attractive corpuscles directed in an infinite number of rays; those, say they, ascend and then descend in such a manner, that the nearer a body approaches to the earth's centre, the more of these attractive rays press upon it, in consequence of which its motion becomes accelerated. The Cartesians again ascribed the effect to the reiterated impulses of their *materia subtilis* acting continually on falling bodies, and propelling them downwards. It appears now incredible how such dreams could have been gravely proposed by men having the reputation of philosophers. Galileo, however, on considering the subject attentively, and applying the powerful aids of geometry and mathematics, soon discovered that the true cause was simply the continued action of the moving force of gravity. This force, Galileo reasoned, must operate continually on the body, not only at the moment of starting, but also during every moment of its descent. And as the body retains and accumulates all these impressions according to the great and original law of moving bodies, no wonder that its motion should become continually accelerated: for, suppose that gravity were to act only at certain small intervals, each second for instance, and suppose that at first it communicates such a motion to the body as causes it to descend, say ten feet in the first second; the body could not stop here even though gravity were ceasing altogether to act on it: retaining the original impression, it would still go on moving uniformly at the rate of ten feet every second of its descent; but at the end of the first second, gravity again acts on it and communicates a second impression, by virtue of which it would descend ten feet during the second interval, in addition to the ten feet arising from the original impulse; so that on the whole it descends 20 feet in the second interval. In the same manner, during the third interval it would descend 30 feet, and during the fourth 40, and so on; the space described in each second thus increasing regularly with the increase of the time.

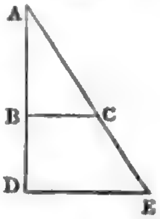
Hence Galileo deduced the fundamental law of acceleration in falling bodies, that the *Velocity*, which in every case is just the space described in each second or other fixed interval, *increases in exact proportion to the whole time of descent*; so that whatever be the velocity at the end of the first second, then at the end of any number of seconds the velocity would just be as many times greater,—a law from which he easily deduced all the others regarding the descent of falling bodies, which are of so much importance in mechanical inquiries. The most remarkable is that which regards the *Space*[1] described, or the total amount of the descent in a given time. This Galileo deduced very elegantly from a simple geometrical consideration. In every case of a body moving uniformly without acceleration, the space described in any given time must be proportional to the time, and must be found by multiplying the time by the velocity: it may be represented, therefore, by a simple diagram. Let A B, for instance, denote by its length the velocity of the body, or the number of feet described by it in a second, and C D the time or number of seconds during which it is in motion; then, if we construct a rectangle *a* E, of which one of the sides, *a b*, is equal to A B, and the other, *c d*, equal to C D, this rectangle, that is, the number of square feet in it, will denote the space, that is, the number of lineal feet described during the whole period. Let us now apply this principle to the case of a body moving with an accelerated velocity, and let AB, CD, EF, &c. denote the velocities at the end of certain equal intervals of time, of which let each be denoted by *l m*; and suppose also, that during each of these intervals the motion is uniform, and is only accelerated by a sort of start which takes place at the end of each: then, if we construct a rectangle *a l b*, of which *a b* is equal to A B, the velocity at the end of the first interval, and *a l* equal to *l m* the first interval, this rectangle will denote the space described during that interval. Continue now the line *a l* to *m*, making *l m* = *a l* = *l m*, and continue also *l c* to *d*, so that *l d* may be equal to D C, the velocity during the second interval, and complete the rectangle *d l m e*, this will denote the space described in the second interval; and, in the same manner, each of the succeeding rectangles in descending will denote the space described in the succeeding interval, so that the total amount of the descent will be denoted by the sum of all the rectangles together, or by the compound figure which they form. But what is the nature of this figure? It is evidently, as appears more clearly by taking out the parallel lines, triangular, only that the longest side presents a serrated outline. What is the cause of this? It is clearly owing to the supposition we have made of the motion continuing uniform during the intervals, and then increasing by starts; instead of growing continually, as it really does. Suppose then that we shorten the intervals one-half, for instance, and double their number, we shall then be much nearer the truth; but the inequalities in the hypothenuse of the triangle are now greatly reduced; and the more we thus diminish the intervals, and increase their number, the more nearly does it approach to a straight line. In the extreme case, therefore, where there are in reality no intervals, but where the velocity goes on continually increasing, neither will there be any inequalities in the outline; the figure will be really a triangle: and while the vertical side A B denotes the time of descent, and the horizontal B C the velocity, the area of the triangle will denote in square measure the space descended in the given time. But the areas of similar triangles are in every case proportional to the squares of their corresponding sides; that is, the area A B C is to A D E as the square of A B or B C is to the square of A D or D E. Hence in general it follows, that the *spaces* described in any given time or times are always *proportional to the squares of these times*, and also to the *squares of the velocities at the end of such times*. Thus, if a body describes 16 feet during the first second of its descent, it will, during the next, descend 4 times as much, or 64; during the third 9 times, or 144 feet; during the fourth 16 times, or 256, and so on.











Such, then, is the great law of acceleration in regard to the spaces described. It is easily deducible also from numerical or algebraical considerations. Let the velocity, for example, at the end of any given time, such as a second, be denoted by 1; then in the second, third, and fourth, it will be 2, 3, 4, &c. But the space described at the end of any time is evidently equal to the time multiplied by the mean velocity; that is, the velocity at the half-interval. During the first second, therefore, the space described will be $\frac{1}{2}$, during the second $\frac{3}{2}$, during the third $\frac{5}{2}$, during the fourth $\frac{7}{2}$, and so on; adding these successively, the whole space from the beginning at the end of each interval will be $\frac{1}{2}$, $\frac{4}{2}$, $\frac{9}{2}$, $\frac{16}{2}$, &c., being each proportional to the square of the time. Algebraically again, if we suppose gravity to act only at the end of successive intervals, and the motion to continue uniform during these, then the spaces described will form an arithmetical progression, such as a, $2\,a$, $3\,a$, $4\,a$, $5\,a$, &c. … $n\,a$, and the whole space will be the sum of this series, or $a + n\,a \times \frac{n}{2} =$

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[1] This phrase, we may remark, probably from Galileo's geometrical illustration, has been rather aukwardly introduced in these discussions, and in a way which tends to produce a little obscurity. Space generally includes the idea of extension, in at least two dimensions, both length and breadth; whereas it is here employed to denote merely the lineal extent, the length of the track described by the moving body.

Acceleration.

$n^2 + n \times \frac{a}{2}$ Suppose now the intervals diminished in extent and increased in number indefinitely, they will bear no sort of proportion to n^2: the second term of the above sum therefore may be neglected, and ultimately the whole space will be proportional to n^2, the square of the time. In every view, then, this great law is established; and when we come to try it experimentally, which is done by means of Atwood's machine, it is confirmed by the nicest observation; every falling body describing in the first second $16\frac{1}{12}$ feet, and in every other a space proportional to the time. See *Atwood's* Machine, Dynamics, Mechanics, &c. (c.)

Acceleration, in *Astronomy*, is applied in various ways, and to different objects. Thus, the *Acceleration of the Fixed Stars* denotes that apparent increase of motion or velocity by which night after night they arrive sooner and sooner upon the meridian than before. A star which passes the meridian to-night at 10 o'clock, for instance, will to-morrow night arrive at it 3′ 56″ sooner, or at 56′ 4″ past nine, and so on each succeeding evening; thus anticipating continually the motion of the sun, which regulates the length of the day. A star which passes the meridian to-day with the sun, will to-morrow pass 3′ 56″ sooner; so that it appears to revolve with a quicker or accelerated motion. It is in reality the sun, however, moving continually backwards among the stars which causes in them this apparent acceleration.

Acceleration of the Planets denotes that accelerated motion with which they all, as well as the earth, advance from the perigee to the apogee of their orbits. This acceleration is most readily observed by comparing the successive diurnal motions of the planet in its orbit. When the actual diurnal motion exceeds the mean diurnal motion, the planet is accelerated; and, on the other hand, when it falls short of it, it is retarded, as takes place between the apogee and perigee.

Acceleration of the Moon is a remarkable increase which has been discovered in the moon's motion in her orbit, which has been going on increasing from age to age by a gradation so imperceptible, that it was only discovered or suspected by Dr Halley, on comparing the ancient eclipses observed at Babylon and others with those of his own time. The quantity of this acceleration was afterwards determined by Mr Dunthorne from more accurate data regarding the longitudes of Alexandria and Babylon, and from the most authentic eclipse of which any good account remains, observed at Babylon in the year 721 before Christ. The beginning of this eclipse, as observed at that time, was about an hour and three quarters sooner than he found it would have been by computation; and hence he found the mean acceleration, or what has since been termed the moon's secular equation, about 10″ of a degree each century. According to Laplace, it amounts to 11·135″. This remarkable fact had long excited the attention of astronomers; as, along with several others of the same kind among the heavenly bodies, it seemed to betray imperfection; exhibiting inequalities which were continually increasing, instead of correcting themselves or being somehow compensated by that admirable design which prevailed in every other part of the system. At last, however, it was discovered, by the application of a refined analysis, that these inequalities were not perpetual; that they actually terminate in the lapse of ages, and again return in the opposite direction, thus preserving entire the harmony of the celestial motions. This fine discovery, which observation alone could never have disclosed, we owe to the genius of Laplace. See Astronomy in this work; also *Phil. Trans.* No. 204, 218, and vol. xlvi. 1749, 1750, 1777; *Mém. de l'Acad. Par.* 1757, 1763, 1786; *Mém. de l'Acad. Berlin*, 1773, 1782; *Connoissances des Temps*, 1779, 1782, 1790; Newton's *Principia*, second edition; Say's *Astronomy*; Vince's *Astronomy*; *Astronomie*, par Lalande, &c. (c.)

Acceleration || Accent.

Acceleration of Bodies on inclined Planes. The same general law obtains here as in bodies falling perpendicularly: the effect of the plane is to make the motion slower; but the inclination being everywhere equal, the retardation arising therefrom will proceed equally in all parts, at the beginning and the ending of the motion.

ACCENDENTES, a lower order of ministers in the Romish church, whose office is to light and trim the candles.

ACCENDONES, in Roman antiquity, a kind of gladiators, whose office was to excite and animate the combatants during the engagement. The orthography of the word is contested: the first edition of Tertullian, by Rhenanus, has it *accedones*; an ancient manuscript, *accendones*. Aquinas adheres to the former, Pitiscus to the latter. The origin of the word, supposing it *accendones*, is from *accendo*, I kindle; supposing it *accedones*, from *accedo*, I accede, am added to. The former places their distinguishing character in enlivening the combat by their exhortations and suggestions: the latter supposes them to be much the same with what among us are called *seconds*, among the Italians, *patroni*; excepting that these latter only stand by to see the laws of the sword duly observed, without intermeddling to give advice or instruction.

ACCENSI, in the Roman armies, certain supernumerary soldiers, designed to supply the place of those who should be killed or anywise disabled. They were thus denominated, *quia accensebantur*, or *ad censum adjiciebantur*. Vegetius calls them *supernumerarii legionum*. Cato calls them *ferentarii*, in regard they furnished those engaged in battle with weapons, drink, &c. Nonnius suggests another reason of that appellation, viz. because they fought with stones, slings, and weapons, *quæ feruntur*, such as are thrown, not carried in the hand. They were sometimes also called *velites*, and *velati*, because they fought clothed, but not in armour; sometimes *adscriptitii*, and *adscriptivi*; sometimes *rorarii*. The *accensi*, Livy observes, were placed in the rear of the army, because little was expected from them: they were taken out of the fifth class of citizens.

Accensi, in antiquity, denotes an inferior order of officers, appointed to attend the Roman magistrates, somewhat in the manner of ushers, serjeants, or tipstaves among us. They were thus called from *accire*, to send for; one part of their office being to call assemblies of the people, summon parties to appear and answer before the judges, &c.

Accensi was also an appellation given to a kind of adjutants, appointed by the tribune to assist each centurion and decurion; in which sense *accensus* is synonymous with *optio*. In an ancient inscription, given by Torre, we meet with Accensus Equitum Romanorum; an office nowhere else heard of. That author suspects it for a corruption; and instead thereof reads, A Censibus.

ACCENSION, the action of setting a body on fire: thus the accension of tinder is effected by striking fire with flint and steel.

ACCENT, in *reading* or *speaking*, an inflection of the voice, which gives to each syllable of a word its due pitch in respect of height or lowness. See Reading. The word is originally Latin, *accentus*; a compound of *ad*, to, and *cano*, to sing. *Accentus quasi adcantus*, or *juxta cantum*. In this sense, accent is synonymous with the Greek τονος; the Latin *tenor*, or *tonor*; and the Hebrew טעם, *gustus*, taste.

Accent, among grammarians, is a certain mark or character placed over a syllable to direct the stress of its pronunciation. We generally reckon three grammatical accents in ordinary use, all borrowed from the Greeks, viz. the *acute accent* (´), which shows when the tone of the voice is to be raised; the *grave accent* (`), when the note or tone of the voice is to be depressed; and the *circumflex accent* (ˆ), which is composed of both the acute and the grave, and points out a kind of undulation of the voice. The Latins have made the same use as the Greeks of these three accents.

The Hebrews have a grammatical, a rhetorical, and a musical accent; though the first and last seem, in effect, to be the same, both being comprised under the general name of *tonic accents*, because they give the proper tones to syllables; as the rhetorical accents are said to be euphonic, because they tend to make the pronunciation more sweet and agreeable. There are four euphonic accents, and twenty-five tonic: of these some are placed above, and others below the syllables; the Hebrew accents serving not only to regulate the risings and fallings of the voice, but also to distinguish the sections, periods, and members of periods, in a discourse, and to answer the same purposes with the points in other languages. Their accents are divided into *emperors, kings, dukes*, &c. each bearing a title answerable to the importance of the distinction it makes. Their emperor rules over a whole phrase, and terminates the sense completely; answering to our point. Their king answers to our colon; and their duke to our comma. The king, however, occasionally becomes a duke, and the duke a king, as the phrases are more or less short. It must be noted, by the way, that the management and combination of these accents in Hebrew poetry differ from their management and combination in prose. The use of the tonic or grammatical accents has been much controverted; some holding that they distinguish the sense, while others maintain that they are only intended to regulate the music or singing, alleging that the Jews sing rather than read the Scriptures in their synagogues.[1] Be this, however, as it will, it is certain the ancient Hebrews were not acquainted with these accents. The opinion which prevails amongst the learned is, that they were invented about the sixth century, by the Jewish doctors of the school of Tiberias, called the *Massorets*.

As to the Greek accents, now seen both in manuscripts and printed books, there has been no less dispute about their antiquity and use than about those of the Hebrews. Isaac Vossius endeavours to prove them of modern invention; asserting, that anciently they had nothing of this kind, but only a few notes in their poetry, which were invented by Aristophanes the grammarian, about the time of Ptolemy Philopater; and that these were of musical rather than grammatical use, serving as aids in the singing of their poems, and being very different from those afterwards introduced. He also shows, from several ancient grammarians, that the manner of writing the Greek accents in those days was quite different from that which appears in our books. The author of *La Méthode Grecque*, p. 546, observes, that the right pronunciation of the Greek language being natural to the Greeks, it was needless for them to mark it by accents in their writings; so that, according to all appearance, they only began to make use of them about the time when the Romans, wishing to learn the Greek tongue, sent their children to study at Athens, thinking thereby to fix the pronunciation, and to facilitate it to strangers; which happened, as the same author observes, a little before Cicero's time. Wetstein, Greek professor at Basil, in a learned dissertation, endeavours to prove the Greek accents of an older standing. He owns that they were not always formed in the same manner by the ancients, but he thinks that difference owing to the different pronunciation which obtained in the different parts of Greece. He also brings several reasons, *a priori*, for the use of accents, even in the earliest days: as, that all writing being then in capital letters equidistant from each other, without any distinction either of words or phrases, it could scarcely have been rendered intelligible without accents; and that accents were necessary to distinguish ambiguous words, and to point out their proper meaning, as appears from a dispute in regard to a passage of Homer, mentioned by Aristotle in his *Poëtics*, chap. v. Accordingly, he observes that the Syrians, who have tonic, but not distinctive accents, have yet invented certain points, placed either below or above the words, to show their mood, tense, person, or sense.

Mr Browne of Trinity College, Dublin, has entered more deeply into this investigation; and as he had an opportunity of conversing with the crew of a Greek ship from Patras, a town situated not far distant from the ancient Corinth, which had been driven by stress of weather into the port of Dingle in Ireland, the result of his inquiries was, that the practice of the modern Greeks is different from any of the theories that have been delivered in books. "It is true," he observes, "they have not two pronunciations for prose and for verse, and in both they read by accent; but they make accent the cause of quantity, they make it govern and control quantity, they make the syllable long on which the acute accent falls, and they allow the acute accent to change the real quantity. They always read poetry as well as prose by accent. Whether any inference can hence be drawn as to the pronunciation of the ancients, I must leave, after what I have premised above, to men of more learning; but I think it at least so probable as to make it worth while to mention the instances which occurred in proof of this assertion more particularly. Of the two first persons whom I met, one, the steward of the ship, an inhabitant of the island of Cephalonia, had had a school education: he read Euripides, and translated some easier passages, without much difficulty. By a stay in this country of near two years, he was able to speak English very tolerably, as could also the captain and several of the crew; and almost all of them spoke Italian fluently. The companion, however, of the steward could speak only modern Greek, in which I could discover that he was giving a description of the distress in which the ship had been; and though not able to understand the context, I could plainly distinguish many words, such as δένδρα, ξύλα, and among the rest the sound of Ἄνθρωπος pronounced short. This awoke my curiosity, which was still more heightened when I observed that he said Ἀνθρώπου long, with the same attention to the alteration of the accent with the variety of case, which a boy would be taught to pay at a school in England. Watching therefore more closely, and asking the other to read some ancient Greek, I found that they both uniformly pronounced according to accent, without any attention to long or short syllables where accent came in the way; and on their departure, one of them having bid me good day, by saying Καλημέρα, to which I answered Καλήμερα, he with strong marks of reprobation set me right, and repeated Καλημέρα; and with like censure did the captain upon another occasion observe upon my saying Socrătes instead of Socrātes.

"I now had a strong wish to know whether they observed the distinction in this respect usually between verse and prose; but from the little scholarship of the two men with whom I had conversed, from the ignorance of a third whom I afterwards met, (who however read Lucian with ease, though he did not seem ever to have heard of

[1] Cooper, Dom. Mosaic. Clav. p. 31.

the book,) and on account of my imperfect mode of conversing with them all, I had little hopes of satisfaction on the point; nor was I clear that they perfectly knew the difference between verse and prose. At length, having met with the commander of the ship, and his clerk Athanasius Κνομος, and finding that the latter had been a schoolmaster in the Morea, and had here learnt to speak English fluently, I put the question to them in the presence of a very learned college friend, and at another time, to avoid any error, with the aid of a gentleman who is perfectly master of the Italian language. Both the Greeks repeatedly assured us that verse as well as prose was read by accent, and not by quantity; and exemplified it by reading several lines of Homer, with whose name they seemed perfectly well acquainted.

"I shall give an instance or two of their mode of reading:

Βῆ δ' ἀκέων παρὰ θῖνα πολυφλοίσβοιο θαλάσσης,
Τὸν δ' ἀπαμειβόμενος προσέφη πόδας ὠκὺς Ἀχιλλεύς,
Ἐς δ' ἐρέτας ἐπιτηδὲς ἀγείρομεν, ἐς δ' ἑκατόμβην.

They made the ε in ακέων, προσέφη, and ἐρέτας, long.
But when they read

Κλῦθί μευ, Ἀργυρότοξ', ὃς Χρύσην ἀμφιβέβηκας,

they made the second syllable of the first word Κλυθι short, notwithstanding the acute accent: on my asking why, they desired me to look back on the circumflex on the first syllable, and said it thence necessarily followed; for it is impossible to pronounce the first syllable with the great length which the circumflex denotes, and not to shorten the second. The testimony of the schoolmaster might be vitiated; but what could be stronger than that of these ignorant mariners as to the vulgar common practice of modern Greece? and it is remarkable that this confirms the opinion of Bishop Horsley, that the tones of words in connection are not always the same with the tones of solitary words, though in those of more than one syllable the accentual marks do not change their position. I must here add, that these men confirmed an observation which I have heard made, that we are much mistaken in our idea of the supposed lofty sound of πολυφλοίσβοιο θαλασσης; that the borderers on the coast of the Archipelago take their ideas from the gentle laving of the shore by a summer wave, and not from the roaring of a winter ocean; and they accordingly pronounced it *polyphlisveo thalasses.*

"I own that the observations made by me on the pronunciation of these modern Greeks brought a perfectly new train of ideas into my mind. I propose them, with humility, for the consideration of the learned; but they have made a strong impression upon me, and approached, when compared with other admitted facts, nearly to conviction. In short, I am strongly inclined to believe, that what the famous treatise so often mentioned on the prosodies of the Greek and Latin languages mentions as the peculiarity of the English, that we always prolong the sound of the syllable on which the acute accent falls, is true, and has been true of every nation upon earth. We know it is true of the modern Italians: they read Latin in that respect just as we do, and say, *Arma virūmquĕ cānŏ*, and, *In nŏvă fert animus*, as much as we. And when we find the modern Greeks following the same practice, surely we have some cause to suppose that the ancients did the same. In the English language, indeed, quantity is not affected, because accent and quantity always agree. Bishop Horsley endeavoured to prove that they did so in Greek, but this is on the bold supposition that the accent doth not fall where the mark is placed. The objection to this hypothesis, which seems to have been admitted by all writers, and considered as decisive by some as to prose, by all as to verse, is, that such a mode of pronunciation or reading must destroy metre, or *rhythmus.* From this position, however universal, or however it may have been taken for granted, I totally dissent. That it will oppose the metre or quantity I readily agree; but that it will destroy the rhythmus, (by which, whatever learned descriptions there may have been of its meaning, I understand nothing more than the melody or smooth flowing of the verses, or their harmony, if you please, if harmony be properly applied to successive and not synchronal sounds,) I can by no means admit. On the contrary, nothing can be more disagreeable or unmelodious than the reading verse by quantity, or scanning of it, as it is vulgarly called. Let us try the line so often quoted—

Armă vĭrūmquĕ cānŏ, Trōjǣ qui primūs ăb ōris,

instead of

Àrmă vĭrūmquĕ cānŏ, Trōjǣ quĭ prīmŭs ăb ōrĭs.

"No man ever defined rhythmus better than Plato, *ordinem quendam qui in motibus cernitur;* the motion or measure of the verse may be exact, and yet the order, arrangement, and disposition of the letters and syllables such as to be grating and unmelodious to the ear. In like manner the feet of the verse may be exact, but the stress laid upon particular syllables of it which follows the quantity may totally destroy the melody: in short, the radical error seems to be the confusion of quantity with melody, and the supposition that whatever is at war with quantity and metre must be at war with melody.

"It will be asked, then, what is the use of metre or measure in verse, if we are not to read by it; and here is the grand difficulty; and I own with candour I cannot answer it with perfect satisfaction to my own mind: to those, indeed, who say we are to read by accent in prose, it may be equally asked, what is the use of long or short syllables in prose, if we are not to attend to them when accent comes in the way; but to those who think otherwise, I can only answer, that in the first place accent doth not always interfere, and then quantity is our guide, and accent often accords with quantity. Secondly, metre determines the number of feet or measures in each verse, and thereby produces a general analogy and harmony through the whole; and it is to be observed, that, as I apprehend, accent doth not change the number of feet, though it doth the nature or species of them. Thus when we read

Arma virumque cāno, Trōjæ qui primus ab oris,

we do not make more feet than when we scan the line, nor employ more time than in pronouncing the next line, in which the accent happens to accord with the quantity, viz.

Italiam fato profugus, Lavinaque venit.

Thirdly, the poet in measuring his verse certainly must be confined to some certain number and order of long and short syllables, in order to produce a concordance through the whole, and even to regulate the position of accent, which, though not subdued by quantity, will certainly have some relation to it, *euphoniæ gratia;* but surely the length or shortness of a syllable cannot determine where emphasis shall be placed—that must depend on the meaning and the thought; and it would be most absurd for the poet to say to the reader, you shall not rest upon this emphatic and significative word because its syllables are short, and wherever there is a rest, there must be length and intonation." (*Irish Trans.* vol. vii.)

The use of accents to prevent ambiguities is most remarkably perceived in some eastern languages, particularly the Siamese and Chinese. Among the people of China, every word, or, which is the same thing, every syllable, admits of five accents, according as it is spoken more acutely or remissly; and thus stands for many different things. The same sound *ya*, according to the accent affixed to it, signifies *God*, *a wall*, *excellent*, *stupidity*, and a *goose*. The Chinese have but 330 spoken words in their language; but these being multiplied by the different accents or tones which affect the vowels, furnish a language tolerably copious. By means of accents, their 330 simple sounds come to denote 1650 things; but this being hardly sufficient, they are increased further by aspirates added to each word, to double the number. The Chinese only reckon four *accents*, for which the missionaries use the following marks, *aá, á, à, á';* to which they have added a fifth, thus *ā*. They make a kind of modulation, wherein, prolonging the duration of the sound of the vowel, they vary the tone, raising and sinking it by a certain pitch of voice; so that their talking is a sort of music or singing. Attempts have been made to determine the quantity of the rise or fall on each accent by means of musical notes; but this is hard to effect, as being different in different persons. Hence the great difficulty of the language to foreigners, who are forced to sing most scrupulously; for if they deviate ever so little from the accent, they say quite a different thing from what was intended. Thus, meaning to compliment the person you are talking of with the title *Sir*, you call him a beast with the same word, only a little varied in the tone. Magalhon, however, makes the language easier to learn on this account. The Siamese are also observed to sing rather than to talk. Their alphabet begins with six characters, all only equivalent to a K, but differently accented. For though in the pronunciation the accents are naturally on the vowels, yet they have some to diversify such of their consonants as are in other respects the same.

Accent, in *Music*, is a certain enforcement of particular sounds, whether by the voice or instruments, generally used at the beginning of bars.

Acceptance, in *Commerce*, is the subscribing, signing, and making one's self debtor for the sum contained in a bill of exchange or other obligation.

ACCEPTER, or **Acceptor**, the person who accepts a bill of exchange, &c.

ACCEPTILATION, among civilians, an acquittance or discharge given by the creditor to the debtor without the payment of any value.

ACCESSION, in *Law*, is a method of acquiring property, by which, in things that have a close connection or dependence upon one another, the property of the principal thing draws after it the property of the accessory: thus, the owner of a cow becomes likewise the owner of the calf. It sometimes likewise signifies consent or acquiescence.

ACCESSORY, or **Accessary**, something that accedes, or is added to another more considerable thing; in which sense the word stands opposed to PRINCIPAL.

Accessory, or *Accessary*, in *Common Law*, is chiefly used for a person guilty of a felonious offence, not principally, but by participation; as by advice, command, or concealment.

There are two kinds of *accessories; before* the fact, and *after* it. The first is he who commands or procures another to commit felony, and is not present himself; for if he be present he is a principal. The second is he who receives, assists, or comforts any man that has done murder or felony, whereof he has knowledge. A man may also be accessory to an accessory, by aiding, receiving, &c. an accessory in felony.

An accessory in felony shall have judgment of life and member, as well as the principal who did the felony; but not till the principal be first attainted, and convicted or outlawed thereon. Where the principal is pardoned without attainder, the accessory cannot be arraigned; it being a maxim in law, *Ubi non est principalis, non potest esse accessorius:* but if the principal be pardoned, or have his clergy after attainder, the accessory shall be arraigned; 4 and 5 W. et M. cap. 4. And by stat. 1 Anne, cap. 9. it is enacted, that where the principal is convicted of felony, or stands mute, or challenges above 20 of the jury, it shall be lawful to proceed against the accessory in the same manner as if the principal had been attainted; and notwithstanding such principal shall be admitted to his clergy, pardoned, or delivered before attainder. In some cases also, if the principal cannot be taken, then the accessory may be prosecuted for a misdemeanour, and punished by fine, imprisonment, &c. In the lowest and highest offences there are no accessories, but all are principals; as in riots, routs, forcible entries, and other trespasses, which are the lowest offences. So also in the highest offence, which is, according to the English law, high treason, there are no accessories.

Accessories, in petty treason, murder, and in felonies of several kinds, are not to have their clergy. There can be no accessory before the fact in manslaughter, because that is sudden and unprepensed.

Accessory Nerves, in *Anatomy*, a pair of nerves which, arising from the medulla in the vertebræ of the neck, ascend and enter the skull, and pass out of it again with the par vagum, wrapped up in the same common integument, and after quitting them, are distributed into the muscles of the neck and shoulders.

Accessory, among painters, an epithet given to such parts of a history-piece as serve chiefly for ornament, and might have been wholly left out; such as vases, armour, &c.

ACCIAIOLI, Donato, a native of Florence, was born in 1428, and was famous for his learning and the honourable employments which he held. He wrote, a Latin translation of some of Plutarch's Lives; Commentaries on Aristotle's Ethics and Politics; and the Lives of Hannibal, of Scipio, and of Charlemagne. He was sent to France by the Florentines, to solicit aid from Louis XI. against Pope Sixtus IV., but on his journey died at Milan in 1478: his body was carried to Florence, and buried in the church of the Carthusians at the public expense. The small fortune he left his children is a proof of his probity and disinterestedness. His daughters, like those of Aristides, were portioned by his fellow-citizens, as an acknowledgement of his services. His funeral eulogium was spoken by Christopher Landini; and an elegant epitaph, by Politian, was inscribed on his tomb.

ACCIDENT, in *Grammar*, implies a property attached to a word, without entering into its essential definition; for every word, notwithstanding its signification, will be either primitive, derivative, simple, or compound, which are the accidents of words. A word is said to be primitive when it is taken from no other word in the language in which it is used: thus *heaven, king, good*, are primitive words. It is said to be derivative when it is taken from some other word: thus *heavenly, kingdom, goodness*, &c. are derivatives. A simple word is easily distinguished from a compound: thus *just, justice*, are simple words; *unjust, injustice*, are compound: *res* is a simple word, as well as *publica;* but *respublica* is a compound. Besides these accidents, which are common to all sorts of words, each particular species has its accidents: thus the accidents of the noun substantive are the gender, declension, and number; and the adjective has another accident, namely, the comparison.

Accident, in *Heraldry*, an additional point or mark in a coat of arms, which may be either omitted or retained without altering the essence of the armour; such as abatement, difference, and tincture.

Accident, among *Logicians*, is used in a threefold sense. 1. Whatever does not essentially belong to a thing; as the clothes a man wears, or the money in his pocket. 2. Such properties in any subject as are not essential to it: thus, whiteness in paper is an accidental quality. 3. In opposition to substance, all qualities whatever are called accidents; as sweetness, softness, &c.

ACCIDENTAL, in *Philosophy*, is applied to that effect which flows from some cause intervening by accident, without being subject, or at least without any appearance of being subject, to general laws or regular returns. In this sense *accident* is opposed to *constant* and *principal*. Thus the sun's place is, with respect to the earth, the constant and principal cause of the heat in summer and the cold in winter; whereas winds, snows, and rains, are the accidental causes which often alter and modify the action of their principal cause.

Accidental Colours are those which depend upon the affections of the eye, in contradistinction to those which belong to light itself. The impressions made upon the eye by looking stedfastly on objects of a particular colour are various, according to the single colour or combination of colours in the object; and they continue for some time after the eye is withdrawn, and give a false colouring to other objects. M. Buffon has endeavoured to trace the connections which these accidental colours have with such as are natural, in a variety of instances. The subject has also been considered by De la Hire and M. Æpinus. M. d'Arcy has contrived a machine for determining the duration of those impressions on the eye; and from the result of several experiments, he inferred, that the effect of the action of light on the eye continued about eight thirds of a minute.

Accidental Point, in *Perspective*, is that point in the horizontal line where the projections of two lines parallel to each other meet the perspective plane.

ACCIPITER, among the Romans, signified a hawk, which, from its being very carnivorous, they considered as a bird of bad omen:

> Odimus accipitrem, quia semper vivit in armis. Ovid.

Pliny however tells us, that in some cases, particularly in marriage, it was esteemed a bird of good omen, because it never eats the hearts of other birds; intimating thereby, that no differences in a married state ought to reach the heart. The accipiter was worshipped as a divinity by the inhabitants of Tentyra, an island in the Nile, being considered by them as the image of the sun; and hence we find that luminary represented, in hieroglyphics, under the figure of a hawk.

ACCIPITRES, the name of Linnæus's first order of birds.

ACCISMUS denotes a feigned refusal of something which a person earnestly desires. The word is Latin; or rather Greek, ακκισμος; supposed to be formed from *Acco*, the name of a foolish old woman noted in antiquity for an affectation of this kind.

ACCIUS, Lucius, a Latin tragic poet, the son of a freedman, and, according to St Jerome, born in the consulship of Hostilius Mancinus and Attilius Serranus, in the year of Rome 583; but there appears somewhat of confusion and perplexity in this chronology. He made himself known before the death of Pacuvius by a dramatic piece, which was exhibited the same year that Pacuvius brought one upon the stage; the latter being then eighty years of age, and Accius only thirty. We do not know the name of this piece of Accius's, but the titles of several of his tragedies are mentioned by various authors. He wrote on the most celebrated stories which had been represented on the Athenian stage; as Andromache, Andromeda, Atreus, Clytemnestra, Medea, Meleager, Philoctetes, the civil wars of Thebes, Tereus, the Troades, &c. He did not always, however, take his subjects from the Grecian story; for he composed one dramatic piece wholly Roman: it was entitled *Brutus*, and related to the expulsion of the Tarquins. It is affirmed by some that he wrote also comedies; which is not unlikely, if he was the author of two pieces, the Wedding, and the Merchant, which have been ascribed to him. He did not confine himself to dramatic writing; for he left other productions, particularly his Annals, mentioned by Macrobius, Priscian, Festus, and Nonnius Marcellus. He has been censured for writing in too harsh a style, but in all other respects has been esteemed a very great poet. He was so much esteemed by the public, that a comedian was punished for only mentioning his name on the stage. Cicero speaks with great derision of one Accius who had written a history; and, as our author had written annals, some insist that he is the person censured: but as Cicero himself, Horace, Quintilian, Ovid, and Paterculus, have spoken of our author with so much applause, we cannot think it is the same person whom the Roman orator censures with so much severity.

Accius, a poet of the 16th century, to whom is attributed *A Paraphrase of Æsop's Fables*, on which Julius Scaliger bestows great encomiums.

ACCLAMATION, a confused noise or shout of joy, by which the public express their applause, esteem, or approbation.

Acclamation, in a more proper sense, denotes a certain form of words, uttered with extraordinary vehemence, and in a peculiar tone somewhat resembling a song, frequent in the ancient assemblies. Acclamations were usually accompanied with applauses, with which they are sometimes confounded, though they ought to be distinguished; as acclamation was given by the voice, applause by the hands: add, that acclamation was also bestowed on persons absent, applause only on those present. Acclamation was also given by women, whereas applause seems to have been confined to men.

Acclamations are of various kinds; ecclesiastical, military, nuptial, senatorial, synodical, scholastical, theatrical, &c. We meet with loud acclamations, musical and rhythmical acclamations; acclamations of joy and respect, and even of reproach and contumely. The former, wherein words of happy omen were used, were also called *Laudationes et bona vota*, or good wishes; the latter, *Execrationes et convicia*. Suetonius furnishes an instance of this last kind in the Roman senate, on occasion of the decree for demolishing the statues of Domitian, when the fathers, as the historian represents it, could not refrain from contumelious acclamations of the deceased. The like were shown after the death of Commodus, where the acclamations run in the following strain:—*Hosti patriæ honores detrahantur, parricidæ honores detrahantur; hostis statuas undique, parricidæ statuas undique, gladiatoris statuas undique*, &c. The formula, in acclamations, was repeated sometimes a greater, sometimes a lesser number of times. Hence we find in Roman writers, *acclamatum est quinquies, et vicies;* five times, and twenty times; sometimes also *sexagies*, and even *octuagies;* sixty and eighty times.

Acclamations were not unknown in the theatres in the earliest ages of the Roman commonwealth; but they were artless then, and little other than confused shouts. Afterwards they became a sort of regular concerts. That mentioned by Phædrus, *Lætare incolumis, Roma, salvo Prin-*

cipe, which was made for Augustus, and proved the occasion of a pleasant mistake of a flute-player called *Princeps*, shows that musical acclamations were in use in that emperor's reign. *Revertentem ex provincia modulatis carminibus prosequebantur*, says Suetonius, who gives another instance in the time of Tiberius: a false report of Germanicus's recovery being spread through Rome, the people ran in crowds to the Capitol with torches and victims, singing, *Salva Roma, Salva Patria, Salvus est Germanicus.* Nero, passionately fond of music, took special care to improve and perfect the music of acclamations. Charmed with the harmony with which the Alexandrians, who came to the games celebrated at Naples, had sung his praises, he brought several over to instruct a number of youth, chosen from among the knights and people, in the different kinds of acclamations practised in Alexandria. These continued in use as long as the reign of Theodoric. But the people did not always make a single chorus; sometimes there were two, who answered each other alternately: thus, when Nero played in the theatre, Burrhus and Seneca, who were on either hand, giving the signal by clapping, 5000 soldiers, called *Augustals*, began to chant his praise, which the spectators were obliged to repeat. The whole was conducted by a music-master, called *mesochorus* or *pausarius*. The honour of acclamations was chiefly rendered to emperors, their children, and favourites; and to the magistrates who presided at the games. Persons of distinguished merit also sometimes received them, of which Quintilian gives us instances in Cato and Virgil. The most usual forms were, *Feliciter*, *Longiorem vitam*, *Annos felices*. The actors themselves, and they who gained the prizes in the games of the circus, were not excluded the honour of acclamations.

To theatrical acclamations may be added those of the soldiery and the people in time of triumph. The victorious army accompanied their general to the Capitol; and, among the verses they sung in his praises, frequently repeated Io TRIUMPHE, which the people answered in the same strain. It was also in the way of acclamation that the soldiers gave their general the title of *Imperator*, after some notable victory; a title which he only kept till the time of his triumph.

The acclamations of the senate were somewhat more serious than the popular ones, but arose from the same principle, viz. a desire of pleasing the prince or his favourites; and aimed likewise at the same end, either to express the general approbation and zeal of the company, or to congratulate him on his victories, or to make him new protestations of fidelity. These acclamations were usually given after a report made by some senator, to which the rest all expressed their consent by crying, OMNES, OMNES; or else, ÆQUUM EST, JUSTUM EST. Sometimes they began with acclamations, and sometimes ended with them, without other debates. It was after this manner that all the elections and proclamations of emperors, made by the senate, were conducted; something of which practice is still retained at modern elections of kings and emperors, where *Vivat Rex*, and *Long live the King*, are customary forms of acclamation.

The Greeks borrowed the custom of receiving their emperors in the public places from the Romans. Luitprand relates, that at a procession where he was present, they sung to the Emperor Nicephorus, πολλα ετη; that is, *many years*; which Coddin expresses thus, by το ψαλλειν το πολυχρονιον, or by το πολυχρονιζειν; and the wish or salutation by πολυχρονισμα. And at dinner, the Greeks then present wished with a loud voice to the emperor and Bardas, *Ut Deus annos multiplicet*, as he translates the Greek. Plutarch mentions an acclamation so loud, upon occasion of Flaminius's restoring liberty to Greece, that the very birds fell from heaven with the shout. The Turks practise something like this, on the sight of their emperors and grand viziers, to this day.

For the acclamations with which authors, poets, &c. were received, who recited their works in public; it is to be observed, the assemblies for this purpose were held with great parade in the most solemn places, as the Capitol, temples, the Athenæum, and the houses of great men. The chief care was that the acclamations might be given with all the order and pomp possible. Men of fortune who pretended to wit, kept able applauders in their service, and lent them to their friends. Others endeavoured to gain them by presents and treats. Philostratus mentions a young man named Vavus, who lent money to the men of letters, and forgave the interest to such as applauded his exercises. These acclamations were conducted much after the same manner as those in the theatre, both as to the music and the accompaniments: they were to be suited both to the subject and to the person. There were particular ones for the philosophers, for orators, for historians, and for poets. It would be difficult to rehearse all the forms of them; one of the most usual was *Sophos*, which was to be repeated three times. Martial comprehends several other usual forms in this verse:

Graviter, Cito, Nequiter, Euge, Beate.

Neither the Greeks nor Romans were barren on this head. The names of gods and heroes were given to those whom they would extol. It was not enough to do it after each head of discourse, chiefly after the exordium; but the acclamations were renewed at every fine passage, frequently at every period.

The acclamations with which the spectators honoured the victories of the athletæ, were a natural consequence of the impetuous motions which attended the gymnastic games. The cries and acclamations of the people, sometimes expressing their compassion and joy, sometimes their horror and disgust, are strongly painted by different poets and orators.

Acclamations made also a part of the ceremony of marriage. They were used for the omen's sake, being the *Læta Omina* sometimes spoken of before marriage in Roman writers.

Acclamations, at first practised in the theatre, and passing thence to the senate, &c. were, in process of time, received into the acts of councils, and the ordinary assemblies of the church. The people expressed their approbation of the preacher variously; the more usual forms were, *Orthodox! Third Apostle*, &c. These acclamations being sometimes carried to excess, and often misplaced, were frequently prohibited by the ancient doctors, and at length abrogated; though they appear to have been in some use about the time of St Bernard.

ACCLAMATION MEDALS, among *Antiquaries*, such as represent the people expressing their joy in the posture of acclamation.

ACCLIVITY, the rise or ascent of a hill, in opposition to the declivity or descent of it. Some writers on fortification use it for the talus of a rampart.

ACCOLA, among the Romans, signified a person who lived *near* some place; in which sense it differed from *incola*, the *inhabitant* of such a place.

ACCOLADE, a ceremony anciently used in the conferring of knighthood.

Antiquaries are not agreed wherein the accolade properly consisted. The generality suppose it to be the embrace or kiss which princes anciently gave the new knight, as a token of their affection: whence the word *accolade*; *q. d.* a clasping, or taking round the neck. Others will rather have it to be a blow on the chine of the neck, given on the same occasion. The Accolade is of some antiquity, in whichsoever of the two senses it be taken. Gregory of Tours writes, that the kings of France, even of the first race, in conferring the gilt shoulder-belt, kissed the knights on the left cheek. For the *accolée*, or blow, John of Salisbury assures us it was in use among the ancient Normans: by this it was that William the Conqueror conferred the honour of knighthood on his son Henry. At first it was given with the naked fist, but was afterwards changed into a blow with the flat of the sword on the shoulder of the knight.

ACCOLE'E, sometimes synonymous with ACCOLADE. It is also used in various senses in heraldry: sometimes it is applied to two things joined; at other times, to animals with crowns or collars about their necks, as the lion in the Ogilvys' arms; and, lastly, to keys, batoons, maces, swords, &c. placed saltierwise behind the shield.

ACCOLTI, BENEDICT, was born at Arezzo in 1415. He became a professor of law at Florence; and having been admitted a citizen, was elected chancellor of the republic in 1459. His death took place in 1466. He wrote in Latin a treatise concerning the war which the Christians carried on against the infidels to recover Judea and the holy sepulchre. This work is the ground-plot of Tasso's *Jerusalem Delivered*. It only includes, however, the history of the first crusade. He also wrote an account of the *Excellent Personages of his Time*, in the form of a dialogue.

ACCOLTI, *Francis*, brother of Benedict, was born about the year 1418. He was professor of jurisprudence in Bologna, Ferrara, and some other universities. He died in 1483, leaving behind him several works on law, some translations from the Greek, and some poetical pieces. There is, in the Ambrosian library at Milan, a collection of his Letters, written in the Latin language.

ACCOMMODATION, the application of one thing, by analogy, to another; or the making two or more things agree with one another. To know a thing by *accommodation*, is to know it by the idea of a similar thing referred thereto.

A prophecy of Scripture is said to be fulfilled in various ways: properly, as when a thing foretold comes to pass; and improperly, or by way of *accommodation*, when an event happens to any place or people, like to what fell out some time before to another. Thus, the words of Isaiah, spoken to those of his own time, are said to be fulfilled in those who lived in our Saviour's, and are *accommodated* to them: "Ye hypocrites, well did Esaias prophesy of you," &c.; which same words St Paul afterwards *accommodates* to the Jews of his time.

The primitive church *accommodated* multitudes of Jewish, and even Heathen ceremonies and practices, to Christian purposes; but the Jews had before done the same by the Gentiles: some will even have circumcision, the tabernacle, brazen serpent, &c. to have been originally of Egyptian use, and only *accommodated* by Moses to the purposes of Judaism.[1] Spencer maintains, that most of the rites of the old law were in imitation of those of the Gentiles, and particularly of the Egyptians; that God, in order to divert the children of Israel from the worship they paid to their false deities, consecrated the greater part of the ceremonies performed by those idolaters, and had formed out of them a body of the ceremonial law; that he had indeed made some alterations therein, as barriers against idolatry; and that he thus *accommodated* his worship to the genius and occasions of his ancient people. To this condescension of God, according to Spencer,[2] is owing the origin of the tabernacle, and particularly that of the ark. These opinions, however, have been controverted by later writers.

ACCOMPANIMENT, ACCOMPAGNAMENTO, ACCOMPAGNATURA, in *Music*, denotes the instruments which accompany a voice, in order to sustain it, as well as to make the music more full. The accompaniment is used in recitative as well as in song, on the stage as well as in the choir, &c. The ancients had likewise their accompaniments in the theatre; they had even instruments to accompany the chorus, different from those which accompanied the actors in the recitation.

The accompaniment, among the moderns, is frequently a different part or melody from the song it accompanies. It is disputed whether it was so among the ancients. It is generally alleged that their accompaniments went no further than the playing in octave, or in antiphony to the voice. The Abbé Fraguier, from a passage in Plato, pretends to prove that they had actual symphony, or music in parts; but his arguments seem far from being conclusive.

ACCOMPANIMENT, in *Painting*, denotes such objects as are added, either by way of ornament or fitness, to the principal figures; as dogs, guns, game, &c. in a hunting piece.

ACCOMPANIMENT, in *Heraldry*, any thing added to a shield by way of ornament; as the belt, mantling, supporters, &c. It is also applied to several bearings about a principal one; as a saltier, bend, fesse, chevron, &c.

ACCOMPLICE, one that has a hand in a business, or is privy in the same design or crime with another. The Council of Sens, and the statutes of several other synods, expressly prohibit the revealing of *accomplices*.

ACCOMPLISHMENT, the entire execution or fulfilling of any thing.

ACCOMPLISHMENT is principally used in speaking of events foretold by the Jewish prophets in the Old Testament, and fulfilled under the New. We say a literal accomplishment, a mystical or spiritual accomplishment, a single accomplishment, a double accomplishment, a Jewish accomplishment, a Christian, a Heathen accomplishment. The same prophecy is sometimes accomplished in all or in several of those different ways. Thus, of some of the prophecies of the Old Testament, the Jews find a literal accomplishment in their own history, about the time when the prophecy was given; the Christians find another in Christ, or the earliest days of the church; the Heathens another in some of their emperors; the Mahometans another in their legislator, &c. There are two principal ways of accomplishing a prophecy; *directly*, and by *accommodation*. See ACCOMMODATION, and PROPHECY.

ACCORD, in *Painting*, is the harmony that reigns among the lights and shades of a picture.

ACCORDS, SIEUR DES. See TABOUROT, STEPHEN.

ACCORSO (in Latin *Accursius*), FRANCIS, an eminent lawyer, was born at Florence, according to some, in 1151, according to others, in 1182. He began the study of law at a late period of life; but such were his assiduity and proficiency, that he soon distinguished himself. He was appointed professor at Bologna, and became a very eminent teacher. He undertook the great work of uniting and arranging into one body the almost endless comments and remarks upon the Code, the Institutes, and Digests, which only tended to involve the subjects in obscurity and contradiction. When he was employed in this work, it is said that, hearing of a similar one proposed and begun by Odofred, another lawyer of Bologna, he feigned indisposition, interrupted his public lectures, and shut himself up, till he had, with the utmost expedition, accomplished his design. His work has the vague title of the *Great Gloss.* The best edition of it is that of Godefroi, published at Lyons in 1589, in 6 vols. folio. Accursius was greatly extolled by the lawyers of the twelfth and thirteenth centuries, but those of the fourteenth and of the sixteenth formed a much lower estimate of his merits. There can be no doubt that he has disentangled with much skill the sense of many laws; but it is equally undeniable that his ignorance of history and antiquities has often led him into absurdities, and been the cause of many defects in his explanations and commentaries. He is said to have lived in opulence, and to have died at Bologna in the seventy-eighth year of his age. His eldest son, Francis, who filled the chair of law at Bologna with great reputation, was invited to Oxford by King Edward I., and in 1275 or 1276 read lectures on law in that university. In 1280 he returned to Bologna, where he died in 1321.

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[1] Saurin, *Diss. O. T.* tom. i.

[2] *De Legibus Hebr.* diss. i. l. 2. p. 32.

Accorso, or Accursius, *Mariangelo,* a learned and ingenious critic, was a native of Aquila, in the kingdom of Naples, and lived about the beginning of the sixteenth century. To a perfect knowledge of Greek and Latin he added an intimate acquaintance with several modern languages. Classical literature was much improved and promoted by his labours. In discovering and collating ancient manuscripts he displayed uncommon assiduity and diligence. His work entitled *Diatribæ in Ausonium, Solinum, et Ovidium,* printed at Rome, in folio, in 1524, is a singular monument of erudition and critical skill. He bestowed, it is said, unusual pains on Claudian, and made above seven hundred corrections in the works of that poet, from different manuscripts. Unfortunately the world has been deprived of the advantage of these criticisms, for they were never published. An edition of *Ammianus Marcellinus,* which he published at Augsburg in 1533, contains five books more than any former one. He was the first editor of the *Letters of Cassiodorus,* with his *Treatise on the Soul.* The affected use of antiquated terms, introduced by some of the Latin writers of that age, is humorously ridiculed by him, in a dialogue published in 1531, entitled *Osco, Volsco, Romanaque Eloquentia Interlocutoribus, Dialogus Ludis Romanis actus.* It was republished at Rome in 1574, in 4to, with his name. He was also the author of a poem entitled *Protrepticon ad Corycium,* published in a scarce collection named *Coryciana,* printed at Rome in 1524. Accorso had been accused of plagiarism in his notes on Ausonius; and the solemn and determined manner in which he repelled this charge of literary theft, presents us with a singular instance of his anxiety and care to preserve his literary reputation unstained and pure. It is in the following oath: "In the name of gods and men, of truth and sincerity, I solemnly swear, and if any declaration be more binding than an oath, I in that form declare, and I desire that my declaration may be received as strictly true, that I have never read or seen any author from which my own lucubrations have received the smallest assistance or improvement; nay, that I have even laboured, as far as possible, whenever any writer has published any observations which I myself had before made, immediately to blot them out of my own works. If in this declaration I am forsworn, may the pope punish my perjury; and may an evil genius attend my writings, so that whatever in them is good, or at least tolerable, may appear to the unskilful multitude exceedingly bad, and even to the learned trivial and contemptible; and may the small reputation I now possess be given to the winds, and regarded as the worthless boon of vulgar levity."

ACCOUNT, or Accompt, in a general sense, a computation or reckoning of any thing by numbers.—Collectively, it is used to express the books which merchants, traders, bankers, &c. use for recording their transactions in business.

Chamber of Accounts, in the French polity, a sovereign court of great antiquity, which took cognizance of and registered the accounts of the king's revenue; nearly the same with the English *Court of Exchequer.*

ACCOUNTANT, or Accomptant, in the most general sense, is a person skilled in accounts. In a more restricted sense, it is applied to a person or officer appointed to keep the accounts of a public company or office; as the South Sea, the India Company, the Bank, the Excise, &c.

ACCOUNTANT-general, a new officer in the court of chancery, appointed by act of parliament to receive all moneys lodged in court, instead of the masters, and convey the same to the bank of England for security.

ACCRETION, in *Physics,* the increase or growth of an organical body, by the accession of new parts.

Accretion, among civilians, the property acquired in a vague or unoccupied thing, by its adhering to or following another already occupied: thus, if a legacy be left to two persons, one of whom dies before the testator, the legacy devolves to the survivor by right of accretion.

ACCROCHE, in *Heraldry,* denotes a thing's being hooked with another.

ACCUBATION, a posture of the body, between sitting and lying. The word comes from the Latin *accubare,* compounded of *ad,* to, and *cubo,* I lie down. *Accubation,* or *Accubitus,* was the table posture of the Greeks and Romans; whence we find the words particularly used for the lying, or rather (as we call it) sitting down to meat. The Greeks introduced this posture. The Romans, during the frugal ages of the republic, were strangers to it; but as luxury got footing, this posture came to be adopted, at least by the men; for as to women, it was reputed an indecency in them to lie down among the men, though afterwards this too was got over. Children did not lie down, nor servants, nor soldiers, nor persons of meaner condition. They took their meals sitting, as a posture less indulgent. The Roman manner of disposing themselves at table was this:—A low round table was placed in the *cœnaculum,* or dining-room, and about this, usually three, sometimes only two, beds or couches; and, according to their number, it was called *biclinium* or *triclinium.* These were covered with a sort of bedclothes, richer or plainer, according to the quality of the person, and furnished with quilts and pillows, that the guests might lie the more commodiously. There were usually three persons on each bed; to crowd more was esteemed sordid. In eating, they lay down on their left sides, with their heads resting on the pillows, or rather on their elbows. The first lay at the head of the bed, with his feet extended behind the back of the second; the second lay with the back of his head towards the navel of the first, only separated by a pillow, his feet behind the back of the third; and so of the third or fourth. The middle place was esteemed the most honourable. Before they came to table, they changed their clothes, putting on what they called *cœnatoria vestis,* the dining garment; and pulled off their shoes, to prevent soiling the couch.

ACCUBITOR, an ancient officer of the emperors of Constantinople, whose business was to lie near the emperor. He was the head of the youth of the bed-chamber, and had the *cubicularius* and *procubitor* under him.

ACCUMULATION, in a general sense, the act of heaping or amassing things together. Among lawyers it is used in speaking of the concurrence of several titles to the same thing, or of several circumstances to the same proof.

Accumulation of Degrees, in a university, is the taking of several of them together, or at shorter intervals than usual, or than is allowed by the rules of the university.

ACCURSED, something that lies under a curse, or sentence of excommunication.—In the Jewish idiom, *accursed* and *crucified* were synonymous. Among them, every one was accounted *accursed* who died on a tree. This serves to explain the difficult passage in Rom. ix. 3, where the apostle Paul wished himself *accursed after the manner of Christ*, *i. e.* crucified, if happily he might, by such a death, save his countrymen. The preposition *απο*, here made use of, is used in the same sense, 2 Tim. i. 3, where it obviously signifies *after the manner of*.

ACCUSATION, the charging of any person with a criminal action, either in one's own name or in that of the public. The word is compounded of *ad*, to, and *causari*, to plead.

Writers on politics treat of the benefit and the inconveniences of public accusations. Various arguments are alleged both for the encouragement and discouragement of accusations against great men. Nothing, according to Machiavel, tends more to the preservation of a state than frequent accusations of persons intrusted with the administration of public affairs. This, accordingly, was strictly observed by the Romans in the instance of Camillus, accused of corruption by Manlius Capitolinus, &c. Accusations, however, in the judgment of the same author, are not more beneficial than calumnies are pernicious; which is also confirmed by the practice of the Romans. Manlius, not being able to make good his charge against Camillus, was cast into prison.

By the Roman law, there was no public accuser for public crimes; every private person, whether interested in the crime or not, might accuse, and prosecute the accused to punishment or absolution. Cato, the most innocent person of his age, had been accused 42 times, and as often absolved. But the accusation of *private* crimes was never received but from the mouths of those who were immediately interested in them: None (*e. g.*) but the husband could accuse his wife of adultery.

The ancient Roman lawyers distinguished between *postulatio*, *delatio*, and *accusatio*. For, first, leave was desired to bring a charge against one, which was called *postulare*: then he against whom the charge was laid was brought before the judge, which was called *deferre*, or *nominis delatio*: lastly, the charge was drawn up and presented, which was properly the *accusatio*. The accusation properly commenced, according to Pedianus, when the *reus* or party charged, being interrogated, denied he was guilty of the crime, and subscribed his name to the *delatio* made by his opponent.

In Britain, by Magna Charta, no man shall be imprisoned or condemned on any accusation, without trial by his peers or the law; none shall be vexed with any accusation, but according to the law of the land; and no man shall be molested by petition to the king, &c. unless it be by indictment or presentment of lawful men, or by process at common law. Promoters of suggestions are to find surety to pursue them, and if they do not make them good, shall pay damages to the party accused, and also a fine to the king. No person is obliged to answer upon oath to a question whereby he may accuse himself of any crime.

ACCUSATIVE, in *Latin Grammar*, is the fourth case of nouns, and signifies the relation of the noun on which the action implied in the verb terminates; and hence, in such languages as have cases, these nouns have a particular termination, called *accusative*, as, *Augustus vicit Antonium*, Augustus vanquished Antony. Here *Antonium* is the noun on which the action implied in the word *vicit* terminates, and therefore must have the accusative termination. Ovid, speaking of the palace of the sun, says, *Materiem superabat opus*, The work surpassed the materials. Here *materiem* has the accusative termination, because it terminates the action of the verb *superabat*.—In the English language there are no cases, except the genitive; the relation of the noun being shown by the assistance of prepositions, as *of*, *to*, *from*, &c.

ACE, among gamesters, a card or die marked only with one point.

ACELDAMA, in Scripture history, a place without the south wall of Jerusalem, beyond the brook of Siloam, which was called the Potter's Field, because clay of which pots were made was dug out of it. It was afterwards bought with the money with which the high-priests and rulers of the Jews purchased the blood of Jesus Christ; and hence it was called *Aceldama*, the field of blood.

ACENTETUM, or ACENTETA, in *Natural History*, a name given by the ancients to the purest and finest kind of rock-crystal. They used the crystal in many ways; sometimes engraving on it, and sometimes forming it into vases and cups, which were held next in value to the *vasa murrhina* of those times. The crystal they obtained from the island of Cyprus was much esteemed, but often faulty in particular parts, having hairs, cracks, and foulnesses, which they called *salts*, in the middle of the large pieces. Pliny tells us, that when it was used for engraving on, the artist could conceal all these blemishes among the strokes of his work; but when it was to be formed into cups or precious vases, they always chose the Acentetum, which had no flaws or blemishes.

ACEPHALI, or ACEPHALITÆ, a term applied to several sects who refused to follow some noted leader. Thus, the persons who refused to follow either John of Antioch or St Cyril, in a dispute that happened in the council of Ephesus, were termed *Acephali*, without a head or leader. Such bishops, also, as were exempt from the jurisdiction and discipline of their patriarch, were styled *Acephali*.

ACEPHALI, the levellers in the reign of King Henry I. who acknowledged no head or superior. They were reckoned so poor, that they had not a tenement by which they might acknowledge a superior lord.

ACEPHALOUS, or ACEPHALUS, in a general sense, without a head. The term is more particularly used in speaking of certain nations or people, represented by ancient naturalists and cosmographers, as well as by some modern travellers, as formed without heads; their eyes, mouth, &c. being placed in other parts. Such are the Blemmyes, a nation of Africa, near the head of the Niger, represented to be by Pliny and Solinus: *Blemmyis traduntur capita abesse, ore et oculis pectori affixis.* Ctesias and Solinus mention others in India, near the Ganges, *sine cervice, oculos in humeris habentes.* Mela also speaks of people, *quibus capita et vultus in pectore sunt.* And Suidas, Stephanus Byzantinus, Vopiscus, and others after them, relate the like. Some modern travellers have pretended to find acephalous people in America.

Several opinions have been framed as to the origin of the fable of the Acephali. The first is that of Thomas Bartholine, who turns the whole into a metaphor; being convinced, that the name Acephali was anciently given to such as had less brain, or conducted themselves less by the rules of prudence, than others. Olearius rather apprehends that the ancient voyagers, viewing certain barbarous people from the coasts, had been imposed on by their uncouth dress; for that the Samogitians, being short of stature, and going in the severity of winter with their heads covered in hoods, seem at a distance as if they were headless. F. Lafitau says, that by Acephali are only meant people whose heads are sunk below their shoulders. Hulsius, in his epitome of Sir Walter Raleigh's *Voyage to Guiana*, speaks of a people which that traveller found between the lakes of Panama and Cassipa, who had no head or neck; and Hondius, in his map, marks the place with the figures of these monsters. But De Laet[1] rejects the story; being informed by others, that the inhabitants of the banks of the Caoru, a river that flows out of the lake of Cassipa, have their heads so far sunk between their shoulders, that many believed they had their eyes in their shoulders, and their mouths in their breasts.

Acephalus, an obsolete term for the tænia or tapeworm, which was long supposed to be acephalous. The first who gave it a head was Tulpius, and after him Fehr: the former even makes it *biceps*, or two-headed.

Acephalus is also used to express a verse defective in the beginning.

ACEQUARA, a town of the kingdom of Naples, in the principality of Citra, with 2263 inhabitants.

ACEQUARIA, a town of Italy, in the grand duchy of Modena, about 18 miles south-west from the capital, with 1360 inhabitants. It is chiefly celebrated for its mineral springs.

ACEQUI, a city, the capital of the province of the same name, in Italy. It is a walled city, partly on the banks of the Bormida, and partly on a hill rising above that river. It has a cathedral, three monasteries, and a nunnery. The inhabitants, who chiefly trade in silk, are 6600. There are some celebrated warm baths, which were known in ancient times, and used by the Romans. It is in Long. 8. 31. E. Lat. 44. 40. N.

ACER, the Maple or Sycamore Tree.

ACERA, the name of a town of Spain, on the river Carion, in the jurisdiction of Saldana and province of Valencia; and also of another on the Ebro, in the department of Reynosa and province of Toro.

ACERB, a sour rough astringency of taste, such as that of unripe fruit.

ACERENZA, a town of the kingdom of Naples, in the province of Basilicata, 80 miles east from Naples, containing 1800 inhabitants.

ACERINA, in *Ichthyology*, a name given by Pliny and other old naturalists to the fish we at this time call the *ruffe*.

ACERNO, a town of Italy, in the citerior principality of Naples, with a bishop's see, and 2400 inhabitants. It is situated 12 miles north-east of Saluno, in Long. 15. 46. E. Lat. 40. 45. N.

ACERRA, in antiquity, an altar erected among the Romans, near the bed of a person deceased, on which his friends daily offered incense till his burial. The real intention probably was to overcome any offensive smell that might arise about the corpse. The Chinese have still a custom like this: they erect an altar to the deceased in a room hung with mourning, and place an image of the dead person on the altar, to which every one that approaches it bows four times, and offers oblations and perfumes.

The *acerra* also signified a little pot, wherein were put the incense and perfumes to be burnt on the altars of the gods and before the dead. It appears to have been the same with what was otherwise called *thuribulum* and *pyxis*.

The Jews had their *acerræ*, in our version rendered *censers*; and the Romanists still retain them under the name of *incense pots*. In Roman writers we frequently meet with *plena acerra*, a full acerra; to understand which, it is to be observed, that people were obliged to offer incense in proportion to their estate and condition; the rich in larger quantities, the poor only a few grains: the former poured out full *acerræ* on the altar, the latter took out two or three bits with their fingers.

Acerra, a town of Italy, in the kingdom of Naples, and in the Terra di Lavoro, seated on the river Agno, 7 miles north-east of Naples; anciently *Acerræ*. It contains 6256 inhabitants. Long. 14. 13. E. Lat. 40. 55. N.

ACESCENT, a word used to denote any thing which is turning sour, or which is slightly acid. It is only applied properly to the former of these two meanings. The second may be expressed by either of the two words *acidulous* or *sub-acid*.

ACESINES, in *Ancient Geography*, a large and rapid river of India, which Alexander passed in his expedition into that country. The kingdom of Porus, which was conquered by Alexander, lay between the Hydaspes and this river, which, uniting with the former and other considerable rivers, pours its waters into the Indus. According to Major Rennell, the modern Chunab is the Acesines of the ancients.

ACESIUS, a bishop of Constantinople in the reign of Constantine, was a rigid adherent to the Novatian doctrines, according to which those whom persecutions had shaken from the faith, or who were guilty of any mortal sin after baptism, could not be admitted to the communion of the church, even after exhibiting the most convincing proofs of sincere repentance. Constantine, who was extremely displeased with the severity of this rigid sect, in discouraging and rejecting repentance, is said to have thus expressed himself: "Then, Acesius, make a ladder for yourself, and go up to heaven alone."

ACETABULUM, in antiquity, a measure used by the ancients, equal to one-eighth of our pint. It seems to have acquired its name from a vessel in which acetum or vinegar was brought to their tables, and which probably contained about this quantity.

Acetabulum, in *Anatomy*, a cavity in any bone for receiving the protuberant head of another, and thereby forming that species of articulation called Enarthrosis.

Acetabulum, in *Botany*, the trivial name of a species of the peziza, or cup peziza, a genus belonging to the cryptogamia fungi of Linnæus. It has got the name of *acetabulum* from the resemblance its leaves bear to a cup.

ACETARY. Grew, in his *Anatomy of Plants*, applies this term to a pulpy substance in certain fruits, *e. g.* the pear, which is inclosed in a congeries of small calculous bodies towards the base of the fruit, and is always of an acid taste.

ACETOSA, Sorrel; by Linnæus joined to the genus *Rumex*.

ACETOSELLA, in *Botany*, a species of Oxalis.

ACETOUS, an epithet applied to such substances as are sour, or partake of the nature of vinegar.

ACETUM, Vinegar, the vegetable acid of the chemists.

ACHÆA, in *Ancient Geography*, a town of the island of Rhodes, in the district of Ialysus, and the first and most ancient of all; said to be built by the Heliades, or grandsons of the sun.

ACHÆANS, the inhabitants of Achaia Propria, a Peloponnesian state. This republic was not considerable, in early times, for the number of its troops, nor for its wealth, nor for the extent of its territories; but it was famed for its probity, its justice, and its love of liberty. Its high reputation for these virtues was very ancient. The Crotonians and Sybarites, to re-establish order in their towns, adopted the laws and customs of the Achæans. After the famous battle of Leuctra, a difference arose betwixt the Lacedemonians and Thebans, who held the virtue of this people in such veneration, that they terminated the dispute by their decision. The government of the Achæans was democratical. They preserved their liberty till the time of Philip and Alexander; but in the reign of these princes, and afterwards, they were either subjected to the Macedonians, who had made themselves masters of Greece, or oppressed by domestic tyrants. The Achæan commonwealth consisted of twelve inconsiderable towns in Peloponnesus. Towards the 124th Olympiad, about the time when Ptolemy Soter died, and when Pyrrhus invaded Italy, the republic of the Achæans recovered its old institutions and unanimity. The inhabitants of Patræ and of Dymæ were the first assertors of ancient liberty. The tyrants were banished, and the towns again made one commonwealth. A public council was then held, in which affairs of importance were discussed and determined. A register was appointed to record the transactions of the council. This assembly had two presidents, who were nominated alternately by the different towns. But instead of two presidents, they soon elected but one. Many neighbouring towns, which admired the constitution of this republic, founded on equality, liberty, the love of justice, and of the public good, were incorporated with the Achæans, and admitted to the full enjoyment of their laws and privileges.—The arms which the Achæans chiefly used were slings. They were trained to the art from their infancy, by slinging from a great distance, at a circular mark of a moderate circumference. By long practice they took so nice an aim, that they were sure, not only to hit their enemies on the head, but on any part of the face they chose. Their slings were of a different kind from those of the Balearians, whom they far surpassed in dexterity.

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[1] *Descript. Amer.* lib. xvii. c. 22.

ACHÆI, Achæans, the inhabitants of Achaia Propria. In Livy, the people of Greece; for the most part called *Achivi* by the Roman poets. In Homer, the general name for Grecians. See Achæans.

ACHÆMENES, according to Herodotus, was grandfather of Cambyses, and great-grandfather of Cyrus the first, king of Persia. Most of the commentators of Horace are of opinion, that the Achæmenes whom that poet mentions, Ode xii. of his 2d book, was one of the Persian monarchs; but if that were true, he must have reigned before the Medes subdued the Persians; for we do not hear of any king of that name from the time that the Persians founded that great monarchy, which is looked upon as the second universal one. However this be, the epithet *Achæmenians* is frequently given to the Persians in the old Latin poets.

Achæmenes, son of Darius I. king of Persia, and brother of Xerxes, had the government of Egypt bestowed on him, after Xerxes had forced the Egyptians to return to their allegiance. He some time after commanded the Egyptian fleet in the celebrated expedition which proved so fatal to all Greece. The Egyptians having again taken up arms after the death of Xerxes, Achæmenes was sent into Egypt to suppress the rebellion, but was vanquished by Inarus, chief of the rebels, succoured by the Athenians.

ACHÆUS, cousin-german to Seleucus Ceraunus and Antiochus the Great, kings of Syria, became a very powerful monarch, and enjoyed the dominions he had usurped for many years; but at last he was punished for his usurpations in a dreadful manner, in the 140th year of Rome, as related by Polybius.[1]

ACHAFALAYA, a river in Louisiana, in North America, or more properly a secondary channel of the Mississippi, by which a part of its waters flows off from the main trunk, and passes to the Gulf of Mexico. Its mouth is about 100 miles westward of the proper mouth of the Mississippi.

ACHAIA, a name taken for that part of Greece which Ptolemy calls *Hellas*, the younger Pliny *Græcia*; now called *Livadia*.

Achaia Propria, anciently a small district in the north of Peloponnesus, running westward along the bay of Corinth, and bounded on the west by the Ionian Sea, on the south by Elis and Arcadia, and on the east by Sicyonia: inhabitants, the *Achæans*, properly so called; its metropolis *Patræ*. It is now called *Romania Alta*, in the Morea.

Achaia also denoted all those countries that joined in the Achæan league, reduced by the Romans to a province. Likewise for Peloponnesus.

Achaiæ Presbyteri, or the Presbyters of Achaia, were those who were present at the martyrdom of St Andrew the apostle, A. D. 59; and are said to have written an epistle in relation to it. Bellarmin, and several other eminent writers in the church of Rome, allow it to be genuine; while Du Pin and some others expressly reject it.

ACHAIUS, son of Ethwin, was raised to the crown of Scotland, A. D. 788. The Emperor Charlemagne sent an embassy to this prince, to request an alliance with him against the English, whose pirates so infested the seas that the merchants could not carry on their trade. The alliance was concluded in France, upon conditions so advantageous to the Scots, that Achaius, to perpetuate the memory of it, added to the arms of Scotland a double field sowed with lilies. He died in 819.

ACHALALACTLI, a species of king's-fisher.

ACHAN, the son of Carmi, of the tribe of Judah, at the taking of Jericho, concealed two hundred shekels of silver, a Babylonish garment, and a wedge of gold, contrary to the express command of God. This sin proved fatal to the Israelites, who were repulsed at the siege of Ai. In this dreadful exigence, Joshua prostrated himself before the Lord, and begged that he would have mercy upon his people. Achan was discovered by casting lots, and he and his children were stoned to death. This expiation being made, Ai was taken by stratagem. (Josh. vii. viii.)

ACHANE, an ancient Persian corn measure, containing 45 Attic medimni.

ACHARACA, anciently a town of Lydia, situated between Tralles and Nysa; in which were the temple of Pluto and the cave Charonium, where patients slept in order to obtain a cure.

ACHAT, in *Law*, implies a purchase or bargain. And hence probably purveyors were called *Achators*, from their making bargains.

ACHATES, the companion of Æneas, and his most faithful friend, celebrated in Virgil.

Achates, in *Natural History*, the same as Agate.

Achates, in *Ancient Geography*, a river of Sicily, now the *Drillo*; which runs from north to south, almost parallel with, and at no great distance from the Gela; and rises in the north of the territory of Noto. It gave name to the achates, or agate, said to be first found there.

ACHAZIB, or Achzib, in *Ancient Geography*, a town of Galilee, in the tribe of Asher, nine miles from Ptolemais.—Also a town in the more southern parts of the tribe of Judah.

ACHEEN, Aché, or Achen, a kingdom of Sumatra, in the East Indies, situated on the north-western part of the island, and not extending inland above 50 miles to the south-east. It was formerly a flourishing and extensive state, but has now greatly declined from its importance, having become a prey to anarchy, from the contests of petty chiefs. In 1820 it was bounded, according to the most correct reports, by Tamiang on the eastern, and Sinkel on the western coast of Sumatra. Acheen is esteemed comparatively healthy, being more free from woods and swamps than most other portions of the island; and the fevers and dysenteries to which these are supposed to give occasion, are there said to be uncommon. The soil is light and fertile, and produces a variety of the finest fruits and vegetables; also rice and cotton in great plenty and perfection. Cattle are abundant, and reasonable in price. Though no longer the great mart of eastern commodities, it still carries on a considerable trade with the natives of that part of the coast of Indostan called *Tellinga*, who supply it with the cotton goods of their country, and receive in return, gold dust, sapan wood, betel-nut, patch-leaf, a little pepper, sulphur, camphor, and benzoin. The country is supplied with Bengal opium, and also with iron, and many other articles of merchandise, by the European traders. A manufacture to some extent of a thick species of cotton cloth, and of striped and checked stuffs for the short drawers worn both by Malays and Achenese, is established here, and meets with an extensive sale. They weave also very handsome silk pieces, of a particular form, for that part of the dress which is called by the Malays *cayen serrong*. But this manufacture has of late declined, owing probably to the decay of industry among the inhabitants, and also to the failure in the breed of silk-worms. Gold dust is collected in the mountains near Acheen, but the greater part is brought from the southern ports of Nalaboo and Soosoo. Sulphur is gathered from a volcanic mountain in the neighbourhood, which supplies their own consumption for the manufacture of gunpowder, and admits of a large exportation. Having no convenient coins, though most species of money will be taken here at a valuation, traders commonly make their payments in gold dust, and for that purpose are all provided with scales or small steelyards. They carry their gold about them, wrapped up in pieces of bladder, and often purchase to so small an amount as to make use of grain or seeds for weights. They have besides a thin adulterated gold coin, rudely stamped with Arabic characters, called *maas*.

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[1] Lib. iii. cap. 56.

In their persons the Achenese differ from the rest of the Sumatrans, being taller, stouter, and of a darker complexion. They do not appear to be a distinct people, but are thought, with great appearance of reason, to be a mixture of Battas, Malays, and Moors, from the west of India. In their dispositions they are more active and industrious than their neighbours; they possess more penetration and sagacity; have more general knowledge; and, as merchants, they deal upon a more extensive and liberal footing. Their religion is Mahometanism; and having a great number of mosques and priests, its forms and ceremonies are strictly observed. They speak a mixed language of Malay and Batta, with all the other jargons used by the eastern Mahomedans. In writing, they use the Malay character.

The monarchy is hereditary, and the king usually maintains a guard of 100 sepoys about his palace. When Acheen was a flourishing state, he ruled with despotic authority. There was, however, according to Mr Marsden, a grand council of the nation, which consisted of the sultan at its head; of four chief counsellors, and eight of a lower degree, who sat on the king's right hand; and of 16 others who sat on his left. How far this council shares or controls the royal prerogative, does not seem to be ascertained. "At the king's feet," says Mr Marsden, "sits a woman, to whom he makes known his pleasure; by her it is communicated to an eunuch, who sits next to her; and by him to an officer, who then proclaims it aloud to the assembly. There are also present two other officers, one of whom has the government of the *bazar* or market, and the other the superintending and carrying into execution the punishment of criminals. All matters relative to commerce and the customs of the port come under the jurisdiction of another functionary, who performs the ceremony of giving the *chap* or licence for trade; which is done by lifting a golden-hafted *kris* over the head of the merchant who arrives, and without which he dares not to land his goods. Presents, the value of which is become pretty regularly ascertained, are then sent to the king and his officers. If the stranger be in the style of an ambassador, the royal elephants are sent down to carry him and his letters to the monarch's presence; these being first delivered into the hands of an eunuch, who places them in a silver dish, covered with rich silk, on the back of the largest elephant, which is provided with a machine for that purpose. Within about an hundred yards of an open hall where the king sits, the cavalcade stops, and the ambassador dismounts, and makes his obeisance by bending his body and lifting his joined hands to his head. When he enters the palace, if an European, he is obliged to take off his shoes; and having made a second obeisance, is seated upon a carpet on the floor, where *betel* is brought to him." The crown revenues, which fluctuate considerably, are derived from import and export duties levied on all goods. Monopolies, the approved resource of despotism, also afford a revenue. These are managed by the officer who has the superintendence of commerce, and who frequently uses his power as an instrument of extortion.

Acheen, like all states in the same stage of civilisation, is distinguished by the severity of its punishments; and no commutation is admitted, as in the southern countries. But it is on the poor chiefly that the rod of justice falls with its full weight, the nobles being secure from its retribution by the number of their dependents. Petty theft is punished by suspending the criminal from a tree, with a gun or heavy weight tied to his feet; or by cutting off a finger, a hand, or leg, according to the nature of the theft. Many of these mutilated and wretched objects are daily to be seen in the streets. Robbery on the highway and housebreaking are punished by drowning, and afterwards exposing the body on a stake for a few days. If the robbery is committed upon an imaum or priest, the sacrilege is expiated by burning the criminal alive. A man who is convicted of adultery is delivered up to the friends and relations of the injured husband. These discouragements to vice might seem to bespeak a moral and virtuous people; yet all travellers agree in representing the Achenese as one of the most dishonest and flagitious nations of the East.

Acheen was first visited by Portuguese adventurers in 1509, after they had discovered the passage to the East Indies by the Cape of Good Hope. Hostilities immediately commenced with the inhabitants, and continued with various success, until the Portuguese lost Malacca in 1641. About the year 1586 the monarchy of Acheen attained to its greatest height of power and prosperity. It had a flourishing commerce; and the port of Acheen was crowded with vessels from all the Asiatic countries, which were allowed to carry on their trade with the most perfect security. About the year 1600, when the Dutch navigators had penetrated to these seas, some of their vessels which had entered the port of Acheen were nearly cut off by the treachery of the inhabitants. It was in 1602 that Acheen was first visited by the English ships under Captain Lancaster, where they were well received. In 1607, the reigning sultan, having greatly extended his dominions on every side, assumed the title of sovereign. He had some correspondence with King James; and in answering one of his letters, he takes the title of King of Sumatra, and intimates to the king of England his wish that he would send out to him one of his countrywomen for a wife. The French visited Acheen in 1621 under Commodore Beaulieu. The Dutch were now become the powerful rivals of the Portuguese in the eastern seas. They succeeded in 1640, by the aid of their allies the Achenese, in wresting from them Malacca, which they had so long maintained. They afterwards commenced their encroachments on the Achenese, and reduced the extent of their ancient dominion, which, joined to the weakness of the government, occasioned the decline of the Achenese power. In 1641, the sultan Pedncka Siri, who, though of a cruel disposition, was a powerful sovereign, died; and the Achenese monarchy continued in the female line till 1700, when a priest found means to acquire the supreme power. The country was agitated during the whole of the eighteenth century by anarchy, and the most sanguinary revolutions. In 1813, the state of Acheen, formerly so flourishing, was found with hardly any form of civil order existing, every port and village being occupied by petty usurpers, who subsisted by piracy and smuggling. At length the reigning monarch was compelled to abdicate the throne in favour of a shop-keeper's son in Prince of Wales Island; but he was restored in 1819 to his dignity. In the following year, Mr Sartorius, being deputed to Acheen, found the country in a most miserable state; the king's authority a mere nullity; and though a commercial treaty had been concluded, there appeared in the distracted state of the country not the least chance of its provisions being carried into effect, without some direct and active interference to uphold the authority of the government.

Acheen, the capital of the above state, is situated on a river at the north-western extremity of Sumatra, and about a league from the sea, where a road is formed, in which the shipping may be secure under the shelter of several islands. The town is indifferently built of bamboos and rough timber, and raised some feet from the ground on account of the overflow of the river in the rainy season. Its appearance and the nature of the buildings resemble the generality of the Malay bazars, excepting that the superior wealth of this place has occasioned a great number of public edifices, which do not however possess the smallest pretensions to magnificence. The sultan's palace, which is the chief public building, is a very rude and uncouth piece of architecture, designed to resist the force of an enemy, and surrounded with a moat and strong walls, but without any regular plan, or any view to the modern system of military attack. Several pieces of ordnance are planted near the gate, some of which are Portuguese; but two were sent from England by James I., on which the founder's name and the date are still legible. The river on which the town is situated is not large; and the stream being divided into several channels, is rendered shallow at the bar. In the dry monsoon it will not admit boats of any burden, much less large vessels, which lie without in the road formed by the islands off the point. The commerce has fallen off. The chief exports are, brimstone, betel-nut, ratans, benzoin, camphor, gold dust, pepper, and horses; the imports, opium, salt, piece-goods, muslin, &c. The town contains about 8000 houses. Long. 95. 45. E. Lat. 5. 35. N. Marsden's *Sumatra*, Forrest's *Voyage*, Hamilton's *East India Gazetteer*.

ACHELOUS, in fabulous history, wrestled with Hercules, for no less a prize than Dejanira, daughter of King Œneus; but as Achelous had the power of assuming all shapes, the contest was long dubious. At last, as he took that of a bull, Hercules tore off one of his horns, so that he was forced to submit, and to redeem it by giving the conqueror the horn of Amalthea, the same with the cornucopia, or horn of plenty; which Hercules, having filled with a variety of fruits, consecrated to Jupiter. Some explain this fable, by saying, that Achelous is a winding river of Greece, whose stream was so rapid, that it roared like a bull, and overflowed its banks; but Hercules, by bringing it into two channels, broke off one of the horns, and so restored plenty to the country. See the next article.

Achelous, a river of Acarnania, which rises in Mount Pindus, and dividing Ætolia from Acarnania, falls into the Ionian Sea. It was formerly called *Thoas*, from its impetuosity, and *king of rivers*. (Homer.) The epithet *Achelоius* is used for *Aqueus* (Virgil), the ancients calling all water *Achelous*, especially in oaths, vows, and sacrifices, according to Ephorus: now called *Aspro Potamo*. Rivers are by the ancient poets called *Tauriformes*, either from the bellowing of their waters, or from their ploughing the earth in their course. Hercules, restraining by dykes and mounds the inundations of the *Achelous*, is said to have broken off one of his horns, and to have brought back plenty to the country. See the preceding article.

ACHENWALL, Gottfried, a German writer, who obtained considerable celebrity from having first reduced statistics to a regular branch of study, and excited much of the attention of others to the subject. He was born at Elbing, in East Prussia, in October 1719. He studied, according to the custom of Germany, in several universities; and was at Jena, Halle, and Leipsic, before he took a degree at the last of those cities. He removed to Marburg in 1746, where he continued during two years to read lectures on history, and on the law of nature and of nations, and commenced those inquiries in statistics by which his name became known. In 1748 he removed to Göttingen, where he resided till his death in 1772. He made several journeys to Switzerland, France, Holland, and England, and published numerous small but accurate works on their history, population, products, laws, revenues, and administration. His chief merit lay in the lectures he delivered at the university, where he was a professor, in which he brought forward, in a fixed and steady form, and in a new and luminous point of view, those active powers of states which conduce to their physical and moral prosperity. He was married in 1752 to a lady named Walther, who obtained some celebrity by a volume of poems published in 1750. Both Achenwall and his wife were great contributors to the periodical publications of Göttingen, by which they gained a degree of reputation which, from their labours not having been published in a separate form, has been since nearly forgotten, and owing to which we are unable to place before our readers a correct list of their writings. (G.)

ACHER, a river in the grand duchy of Baden, rising in the Mummel lake, and falling into the Rhine between Lechtenau and Greffern.

ACHERI, Luke d', a learned Benedictine of the congregation of St Maur, was born at St Quintin, in Picardy, in 1609, and made himself famous by printing several works, which till then were only in manuscript: particularly, the Epistle attributed to St Barnabas; the Works of Lanfranc, archbishop of Canterbury; a collection of scarce and curious pieces, under the title of *Spicilegium*, *i. e.* Gleanings, in 13 volumes quarto. The prefaces and notes which he annexed to many of these pieces, show him to have been a man of genius and abilities. There was an edition of this valuable work published in 1725, in three volumes folio; but the editor appears to have taken some unwarrantable liberties with the learned prefaces of his author. Acheri had some share in the pieces inserted in the first volumes of the Acts of the Saints of the order of St Benedict; the title whereof acquaints us that they were collected and published by him and Father Mabillon. After a very retired life, till the age of 76, he died at Paris the 29th of April 1685, in the abbey of St Germain in the Fields, where he had been librarian.

ACHERN, a city, chief of the bailiwick of the same name. It is situated on the Acher, and on the mountain road; has 300 houses, and 1368 inhabitants, several of whom are employed in woollen and in iron manufactures.

ACHERNER, or ACHARNER, a star of the first magnitude in the southern extremity of the constellation ERIDANUS, but invisible in our latitude.

ACHERON, feigned by the poets to have been the son of Ceres, whom she hid in hell for fear of the Titans, and turned into a river, over which souls departed were ferried in their way to Elysium.

ACHERON, in *Ancient Geography*, a river of Thesprotia, in Epirus; which, after forming the lake Acherusia, at no great distance from the promontory of Chimerium, falls into the sea opposite to the isle of Paxo.

ACHERON, or ACHEROS, a river of the Bruttii in Italy, running from east to west, where Alexander, king of Epirus, was slain by the Lucani, being deceived by the oracle of Dodona, which bade him beware of Acheron.

ACHERSET, an ancient measure of corn, conjectured to be the same with our quarter, or eight bushels.

ACHERUSIA PALUS, a lake between Cumæ and the promontory Misenum, now *Il Lago della Collucia*. (Cluverius.) Some confound it with the *Lacus Lucrinus*, and others with the *Lacus Averni*; but Strabo and Pliny distinguish them.—Also a lake of Epirus, through which the Acheron runs.—There is also a cave of the same name, through which Hercules is fabled to have descended to hell to drag forth Cerberus.

ACHIAR is a Malayan word, which signifies all sorts of fruits and roots pickled with vinegar and spice. The Dutch import from Batavia all sorts of achiar, but particularly that of BAMBOO, a kind of cane, extremely thick, which grows in the East Indies. It is preserved there, whilst it is still green, with very strong vinegar and spice; and is called *bamboo achiar*. The name changes according to the fruit with which the achiar is made.

ACHICOLUM is used to express the *fornix*, *tholus*, or *sudatorium* of the ancient baths; which was a hot room where they used to sweat. It is also called *architholus*.

ACHILLÆA, YARROW, MILFOIL, NOSEBLEED, or SNEEZEWORT.

ACHILLEID, ACHILLEIS, a celebrated poem of Statius, in which that author proposed to deliver the whole life and exploits of Achilles; but being prevented by death, he has only treated of the infancy and education of his hero. See STATIUS.

ACHILLES, one of the greatest heroes of ancient Greece, was the son of Peleus and Thetis. He was a native of Phthia, in Thessaly. His mother, it is said, in order to consume every mortal part of his body, used to lay him every night under live coals, anointing him with ambrosia, which preserved every part from burning but one of his lips, owing to his having licked it. She dipped him also in the waters of the river Styx; by which his whole body became invulnerable, except that part of his heel by which she held him. But this opinion is not universal, nor is it a part of his character as drawn by Homer; for in the Iliad (B. xxi. 161.) he is actually wounded in the right arm by the lance of Asteropeus, in the battle near the river Scamander. Thetis afterwards intrusted him to the care of the centaur Chiron, who, to give him the strength necessary for martial toil, fed him with honey and the marrow of lions and wild boars. To prevent his going to the siege of Troy, she disguised him in female apparel, and hid him among the maidens at the court of King Lycomedes; but Ulysses discovering him, persuaded him to follow the Greeks. Achilles distinguished himself by a number of heroic actions at the siege. Being disgusted, however, with Agamemnon for the loss of Briseïs, he retired from the camp; but returning to avenge the death of his friend Patroclus, he slew Hector, fastened his corpse to his chariot, and dragged it round the walls of Troy. At last Paris, the brother of Hector, wounded him in the heel with an arrow, while he was in the temple treating about his marriage with Philoxena, daughter of King Priam. Of this wound he died, and was interred on the promontory of Sigæum; and after Troy was taken, the Greeks sacrificed Philoxena on his tomb, in obedience to his desire, that he might enjoy her company in the Elysian fields. It is said that Alexander, seeing this tomb, honoured it by placing a crown upon it; at the same time crying out, that "Achilles was happy in having, during his life, such a friend as Patroclus, and, after his death, a poet like Homer." Achilles is supposed to have died 1183 years before the Christian era.

ACHILLES *Tatius*. See TATIUS.

TENDO-ACHILLIS, in *Anatomy*, is a strong tendinous cord formed by the tendons of several muscles, and inserted into the os calcis. It has its name from the fatal wound Achilles is said to have received in that part from Paris, the son of Priam.

ACHILLINI, ALEXANDER, was born at Bologna in 1463. He was celebrated as a lecturer both in medicine and philosophy, and was styled the Great Philosopher. Achillini died in 1512. His philosophical works were printed in one volume folio, at Venice, in 1508, and reprinted with considerable additions in 1545, 1551, and 1568. His principal medical works are: 1. Annotationes Anatomicæ, Bonon. 1520, 4to, and Venice, 1521, 8vo. 2. De Humani Corporis Anatomia, Venice, 1521, 4to. 3. In Mundini Anatomiam Annotationes, printed with Katham's Fasciculus Medicinæ, Venice, 1522, fol. 4. De Subjecto Medicinæ, cum annotationibus Pamphili Montii, Venice, 1568. 5. De Chiromantiæ Principiis et Physiognomiæ, fol. without place or year. 6. De Universalibus, Bonon. 1501, fol. 7. De Subjecto Chiromantiæ et Physiognomiæ, Bonon. 1503, fol. and Pavia, 1515, fol.

ACHIOTTE, or ACHIOTE, a foreign drug, used in dyeing and in the preparation of chocolate. It is the same with the substance more usually known by the name of ANNOTTO.

ACHIROPOETOS, a name given by ancient writers to certain miraculous pictures of Christ and the Virgin, supposed to have been made without hands. The most celebrated of these is the picture of Christ preserved in the church of St John Lateran at Rome; said to have been begun by St Luke, but finished by the ministry of angels.

ACHMET, son of Seerim, an Arabian author, has left a book concerning the interpretation of dreams, according to the doctrine of the Indians, Persians, and Egyptians, which was translated into Greek and Latin. The original is now lost. He lived about the fourth century.

ACHMET I. emperor of the Turks, the third son and successor of Mahomet III. ascended the throne before he reached the age of 15. During the period of his reign, the Turkish empire enjoyed at one time great prosperity, and at another was depressed with adversity. The Asiatic rebels, who took refuge in Persia, involved the two empires in a war, during which the Turks lost Bagdad, to recover which every effort proved unsuccessful. In his reign, Transylvania and Hungary were the scenes of war between the Turks and Germans. In addition to the calamities and distresses of war abroad, and internal tumults and broils, a pretender to his throne disturbed his repose, and made attempts on his life. He was much devoted to amusements, and spent his time chiefly in the harem and in the sports of the field. His seraglio consisted of 3000 women; and his hunting establishment was composed of 40,000 falconers, and an equal number of huntsmen, in different parts of his dominions. He expended great sums of money in building, and particularly on a magnificent mosque which he erected in the Hippodrome. Achmet was less cruel than some of his predecessors, but he was haughty and ambitious. He died in 1617, at the age of 29. His three sons successively ascended the throne after him.

ACHMET II. emperor of the Turks, son of Sultan Ibrahim, succeeded his brother Solyman in 1691. The administration of affairs during his reign was feeble and unsettled. The Ottoman territory was overrun by the imperialists; the Venetians seized the Morea, took the isle of Chios, and several places in Dalmatia; and the Arabs attacked and plundered a caravan of pilgrims, and even laid siege to Mecca. Though he never discovered the vigour and sagacity that are essentially requisite in the character of a sovereign, in private life he was mild, devout, and inoffensive. He was fond of poetry and music; and to those about his person, he was cheerful and amiable. He died in 1695, at the age of 50.

ACHMET III. emperor of the Turks, son of Mahomet IV. succeeded his brother Mustapha II. who was deposed in 1703. After he had settled the discontents of the empire, his great object was to amass wealth. With this view he debased the coin, and imposed new taxes. He received Charles XII. of Sweden, who took refuge in his dominions after the battle of Pultowa in 1709, with great hospitality; and, influenced by the sultana mother, he declared war against the Czar Peter, Charles's formidable rival. Achmet recovered the Morea from the Venetians; but his expedition into Hungary was less fortunate, for his army was defeated by Prince Eugene at the battle of Peterwaradin, in 1716. As the public measures of Achmet were influenced by ministers and favourites, the empire during his reign was frequently distracted by political struggles and revolutions. The discontent and sedition of his soldiers at last drove him from the throne. He was deposed in 1730, and succeeded by his nephew Mahomet V. He was confined in the same apartment which had been occupied by his successor previously to his elevation to the throne, and died of apoplexy in 1736, at the age of 74. The intentions of this prince, it is said, were upright; but his talents were moderate, never discovering that vigour of mind and steadiness of action which are so necessary in the character of a sovereign. Excessive confidence in his vizier diminished the splendour of his reign, and probably tended to shorten the period of it.

ACHMET GEDUC, a famous general under Mahomet II. and Bajazet II. in the fifteenth century. When Mahomet II. died, Bajazet and Zezan both claimed the throne, Achmet sided with the former, and by his bravery and conduct fixed the crown on his head. But Bajazet took away his life; shining virtue being always an unpardonable crime in the eyes of a tyrant.

ACHMETSCHET, a town of the peninsula of the Crimea, the residence of the Sultan Galga, who is eldest son of the Khan of Tartary.

ACHMIM, AKMIM, or ECHMIM, a considerable city of Upper Egypt, situated in a district very fertile in grain, cotton, and sugar. The streets are broader and more regular than is usual in Egypt, though, being built only of unburnt brick, they have a dull gloomy appearance. The Greeks have a church, which they hold in great veneration, and which is adorned with granite pillars from the ruins of Chemnis or Panopolis, a celebrated city, of which few other vestiges now remain.

ACHONRY, a small town of Ireland, in the province of Connaught and county of Sligo, seated on the river Shannon.

ACHOR, a valley of Jericho, lying along the river Jordan, not far from Gilgal; so called from Achan, the troubler of Israel, being there stoned to death.

ACHOR, in *Medicine*, a species of HERPES.

ACHOR, in *Mythology*, the god of flies; to whom, according to Pliny, the inhabitants of Cyrene sacrificed, in order to obtain deliverance from the insects, and the disorders occasioned by them.

ACHROMATIC, an epithet expressing want of colour. The word is Greek, being compounded of α privative, and *χρωμα, colour*.

ACHROMATIC Telescopes are telescopes contrived to remedy the aberrations in colours. The invention of the telescope, by which the powers of vision are extended to the utmost boundaries of space, forms an epoch in the history of science. The human intellect had at last emerged from the long night of error, and begun to shine with unclouded lustre. The age of erudition, which arose on the revival of letters, had been succeeded by the age of science and philosophy. The study of the ancient classics had infused some portion of taste and vigour. But men did not long remain passive admirers; they began to feel their native strength, and hastened to exert it. A new impulsion was given to the whole frame of society; the bolder spirits, bursting from the trammels of authority, ventured to question inveterate opinions, and to explore, with a fearless yet discerning eye, the wide fields of human knowledge. Copernicus had partly restored the true system of the world; Stevinus had extended the principles of mechanics; the fine genius of Galileo had detected and applied the laws of motion; the bold excursive imagination of Kepler had, by the aid of immense labour, nearly completed his discovery of the great laws which control the revolutions of the heavenly bodies; and our countryman Napier had just rendered himself immortal by the sublime discovery of logarithms. At this eventful period, amidst the fermentation of talents, the refracting telescope was produced by an obscure glass-grinder in Holland,—a country then fresh from the struggle against foreign oppression, and become the busy seat of commerce and of the useful arts. Yet the very name of that meritorious person, and the details connected with his invention, are involved in much obscurity. On a question of such peculiar interest we shall afterwards endeavour to throw some light, by comparing together such incidental notices as have been transmitted by contemporary writers. In the mean time, we may rest assured that the construction of the telescope was not, as certain authors would insinuate, the mere offspring of chance, but was, like other scientific discoveries, the fruit of close and patient observation of facts, directed with skill, and incited by an ardent curiosity. A new and perhaps incidental

Invention of the telescope.

appearance, which would pass unheeded by the ordinary spectator, arrests the glance of genius, and sets all the powers of fancy to work. But the inventor of the telescope, we are informed, was acquainted besides with the elements of geometry, which enabled him to prosecute his views, and to combine the results with unerring success. No sooner was this fine discovery—admirable for the very simplicity of its principle—whispered abroad, than it fixed the attention of the chief mathematicians over Europe. Kepler, with his usual fertility of mind, produced a treatise on *Dioptrics*, in which he investigated at large the distinct effects of the combinations of different lenses.[1] Galileo, from some very obscure hints, not only divined the composition of the telescope, but actually constructed one, with a concave eye-glass, which still bears his name. This telescope is shorter, but gives less light than another one proposed by Kepler, and called the astronomical telescope, which inverts the objects, and consists likewise of only two lenses, that next the eye being convex. With such an imperfect instrument—the same, indeed, though of rather higher magnifying power, with our modern opera-glass—did the Tuscan artist, as our great poet quaintly styles the philosopher, venture to explore the heavens.[2] He noticed the solar spots, surveyed the cavernous and rocky surface of the moon, observed the successive phases of the planet Venus, and discovered the more conspicuous of Jupiter's satellites. The truths thus revealed shook the inveterate prejudices of the learned, and furnished the most triumphant evidence to the true theory of the universe.

It is painful to remark, that the application of the first telescope in the country which had given it birth was directed to a very different purpose. The maker, after having finished one, judging it of singular use in the military profession, was naturally induced, by the hope of patronage, to present it to the younger Prince Maurice, whose bravery and conduct had so beneficially contributed to the independence of the United Provinces. But at this moment a bloody tragedy was acting in Holland. The chief of the republic, not content with that high station which the gratitude of his fellow-citizens had conferred upon him, sought to aggrandize his power by crushing all opposition. In the prosecution of his ambitious designs, he artfully gained the favour of the undiscerning populace, and joining his intrigues to the violence of the Calvinistic clergy, he succeeded in preferring the charge of a plot against the more strenuous supporters of the commonwealth, which involved them in ruin. Not only was the celebrated Grotius condemned to the gloom of perpetual imprisonment, but the aged senator Barneveldt, whose wise and upright counsels had guided the state amidst all the troubles of a long revolutionary conflict, was led to the scaffold, on the 14th of May 1619, while his persecutor, ashamed to approach the spectacle of his sufferings, beheld at a distance, with the coolness of a tyrant, from the windows of his palace, and *by help of a telescope*, the gesture and aspect of the venerable patriot, and all the melancholy circumstances attending the decollation.[3]

Improvers of the telescope.

The skill and ingenuity of artists and mathematicians were now exerted in attempts to improve the construction of an instrument so fortunately contrived. The perfection of the telescope would require the union, as far as they are capable of being conjoined, of three different qualities,—distinctness of vision, depth of magnifying power, and extent of field. Of these requisites, the first two are evidently the most important, and to attain them was an object of persevering research. For the condition of amplitude and clearness, it was necessary that the principal image, or the one formed by the eye-glass, should be large, bright, and well defined. On the supposition then generally received, that, in the passage of light through the same media, the angle of incidence bears a constant ratio to the angle of refraction, which is very nearly true in the case of small angles, it followed, as a geometrical consequence, that the spherical figure would accurately collect all the rays into a focus. To obtain the desired improvement of the telescope, therefore, nothing seemed to be wanting but to enlarge sufficiently its aperture, or to employ for the eye-glass a more considerable segment of the sphere. On trial, however, the results appeared to be at variance with the hasty deductions of theory, and every sensible enlargement of aperture was found to occasion a corresponding glare and indistinctness of vision. But a discovery made soon afterwards in optics led to more accurate conclusions. Willebrord Snell, a very ingenious Dutch mathematician, who was snatched away at an early age, traced out by experiment, about the year 1629, the true law that connects the angles of incidence and of refraction; which the famous Descartes, who had about this time chosen Holland for his place of residence, published, in 1637, in his *Dioptrics*, under its simplest form, establishing, that the sines of those angles, and not the angles themselves, bore a constant ratio in the transit of light between the same diaphanous media. It hence followed, that the lateral rays of the light which enter a denser medium, bounded by a spherical surface, in the direction of the axis, will not meet this axis precisely in the same point, but will cross it somewhat nearer the surface. In short, the constant ratio or index of refraction will be that of the distances of the actual focus from the centre of the sphere, and from the point of external impact. Since an arc differs from its sine by a quantity nearly proportioned to its cube, the deviation of the extreme rays from the correct focus, or what is called the spherical aberration,

Snell.

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[1] Kepler explained the construction of the astronomical telescope with two convex lenses; he likewise proposed a third glass to restore the inverted image. But Scheiner first employed the astronomical telescope, and described his observations with it in 1630. Father Rheita placed the third lens of Kepler near the primary focus, and thus enlarged the field of view. Such is the arrangement in the common spy-glass, which he gave in 1665.

[2] .... like the moon, whose orb
Through optic glass the Tuscan artist views
At evening from the top of Fesolé,
Or in Valdarno, to descry new lands,
Rivers, or mountains, on her spotty globe. (*Paradise Lost*, book i. 286–290.)

[3] The discovery of the telescope, from the mystery at first practised, is involved in considerable uncertainty. The most probable statement, however, ascribes the invention so early as 1590 to Zachary Jansen, an intelligent spectacle-maker at Middleburg. This intelligent person, led by accident to exercise his ingenuity on the subject, appears to have in private matured the execution of that wonderful though simple instrument. In a short time, however, the secret had transpired; and Laprey or Lippersheim, a townsman of the same profession, produced telescopes for sale between the years 1600 and 1610. But, in 1608, Jansen likewise constructed the compound microscope; and both instruments, by the activity of trade, were now spread quickly over Europe. The telescope was copied, and perhaps improved, by Adrian Metius, son of the celebrated mathematician. It was publicly sold at Frankfort in 1608, and in the following year the instruments were brought by Drebbel for sale to London.

Gregory.

Hadley.

must likewise proceed in that ratio, and consequently will increase with extreme rapidity, as the aperture of the telescope is enlarged. It was now attempted to modify the figure of the object-glass, and to give it those curved surfaces which an intricate geometrical investigation marks out as fitted to procure a perfect concentration of all the refracted rays. Various contrivances were accordingly proposed for assisting the artist in working the lenses into a parabolic or spheroidal shape, and thus obtaining the exact surfaces generated by the revolution of the different conic sections. All those expedients and directions, however, were found utterly to fail in practice, and nature seemed, in this instance, to oppose insurmountable barriers to human curiosity and research. Philosophers began to despair of effecting any capital improvement in dioptrical instruments, and turned their views to the construction of those depending on the principles of catoptrics, or formed by certain combinations of reflecting specula. In 1663, the famous James Gregory, who in many respects may be regarded as the precursor, and in some things even the rival of Newton, published his *Optica Promota*; a work distinguished by its originality, and containing much ingenious research and fine speculation. In this treatise, a complete description is given of the reflecting telescope now almost universally adopted, consisting of a large perforated concave reflector combined with another very small and deep speculum placed before the principal focus. But such was still the low state of the mechanical arts in England, that no person was found capable of casting and polishing the metallic specula with any tolerable delicacy, and the great inventor never enjoyed the satisfaction and transport of witnessing the magic of his admirable contrivance. It was after the lapse of more than half a century, that Hadley,—to whom we likewise owe another instrument scarcely less valuable, the quadrant, or sextant, known by his name—at last succeeded in executing the reflecting telescope. In the first attempt, silvered mirrors had been substituted for the specula; nor did the reflectors come to obtain much estimation, till, about the year 1733, the ingenious Mr Short distinguished himself by constructing them in a style of very superior excellence.

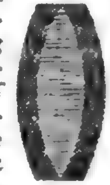
Newton.

But though thus late in guiding the efforts of artists, the optical treatise of Gregory proved the harbinger of that bright day which soon arose to illumine the recesses of physical science. The capacious mind of Newton, nursed in the calm of retirement and seclusion, was then teeming with philosophical projects. In 1665, when the tremendous visitation of the plague raged in London, and threatened Cambridge and other places communicating with the capital, this sublime genius withdrew from the routine of the university to his rural farm near Grantham, and devoted himself to most profound meditation. Amidst his speculations in abstruse mathematics and theoretical astronomy, Newton was induced to examine the opinions entertained by the learned on the subject of light and colours. With this view he had recently procured from the Continent some prisms of glass, to exhibit the phenomena of refraction. Having placed the axis of the prism or glass wedge at right angles to a pencil of light from the sun, admitted through a small hole of the window-shutter in a darkened room, he contemplated the glowing image or spectrum now formed on the opposite wall or screen. This illuminated space was not round, however, as the young philosopher had been taught to expect, but appeared very much elongated, stretching out five times more than its breadth, and marked by a series of pure and brilliant colours. It was therefore obvious that the colours were not confined to the margin of the spectrum, nor could proceed from any varied intermixture of light and shade; and the conclusion seemed hence irresistible, that the white pencil, or solar beam, is really a collection of distinct rays, essentially coloured and differently refracted; that the ray, for instance, which gives us the sensation of the violet, is always more bent aside from its course by refraction than the ray which we term green,—and that this green ray again is more refracted than the red. When the spectrum was divided, by interposing partially a small screen, and each separate parcel of rays made to pass through a second prism, they still retained their peculiar colour and refractive property, but now emerged in parallel, and not in diverging lines as at first. The sun's light is thus decomposed by the action of the prism into a set of primary coloured rays; and these rays, if they be afterwards recombined in the same proportions, will always form a white pencil. It was hence easy to discern the real cause of the imperfection of dioptrical instruments, which is comparatively little influenced by the figure of the object-glass or spherical aberration, but proceeds mainly from the unequal refraction of light itself. The focal distance of the red ray being, in the most favourable case, about one fortieth part shorter than that of the violet ray, the principal image is necessarily affected with mistiness, and its margin always encircled by a coloured ring; for each point of the remote object from which the light arrives is not represented by a corresponding point in the image, but by a small circle composed of graduating colours, the centre being violet and the circumference red. This radical defect seemed at that time to be altogether irremediable. Newton had recourse, therefore, to the aid of catoptrics, and contrived his very simple though rather incommodious reflecting telescope, consisting of a concave speculum, with a small plane one placed obliquely before it, to throw the image towards the side of the tube. This instrument he actually constructed; and with all its rudeness, it promised essential advantages to astronomy. The Newtonian reflector, after having been long neglected, was lately revived by Dr Herschel; and from its great simplicity and moderate dissipation of light, it is perhaps on the whole not ill calculated for celestial observations.

These unexpected and very important discoveries, which entirely changed the face of optics, were soon communicated to the Royal Society, and published in the *Philosophical Transactions* for 1672. They were not received however by the learned with that admiration to which they were justly entitled, but gave occasion to so much ignorant opposition and obstinate controversy, that the illustrious author, thoroughly disgusted at such unmerited reception, henceforth, pursuing his experimental researches in silence, made no disclosure of them to the world till more than thirty years afterwards, when his fame being mature, and his authority commanding respect, he suffered his *Treatise on Optics* to appear abroad. This celebrated production has long been regarded as a model of pure inductive science. The experiments which it relates appear ingeniously devised; the conclusions from them are drawn with acuteness, and pursued with exquisite skill; and the whole discourse proceeds in a style of measured and elegant simplicity. Though the researches were conducted by a process of strict analysis, the composition of the work itself is cast into the synthetical or didactic form, after the manner followed in the elementary treatises of the ancient mathematicians. But with all its beauty and undisputed excellence, it must be confessed that the treatise of optics is not exempt from faults, and even material errors. We should betray the interests of science, if we ever yielded implicit confidence even to the highest master. It is the glory of Newton to have led the way in sublime discovery, and to have impressed whatever he touched with the stamp of profound and original genius. The philosopher paid the debt of human infirmity, by imbibing some tincture of the mystical spirit of the age, and taking a slight bias from the character of his studies. The difficult art of experimenting was still in its infancy, and inquirers had not attained that delicacy and circumspection which, in practice, are indispensable for obtaining accurate results. Most of the speculations in the second and third books of Newton's *Optics*, as we shall afterwards have occasion to observe, are built on mistaken or imperfect views of some facts, which the admixture of extraneous circumstances had accidentally disguised. The very ingenious, but hasty, and often untenable hypotheses, which are subjoined, under the modest and seemingly hesitating title of *Queries*, have, on the whole, been productive of real harm to the cause of science, by the splendid example thus held forth to tempt the rashness of loose experimenters, and of superficial reasoners. Even in the first book of *Optics*, some of the capital propositions are affected by hasty and imperfect statements. The term *refrangibility*, applied to the rays of light, is at least unguarded; it conveys an indistinct conception, and leads to inaccurate conclusions. The different refractions which the primary rays undergo are not absolute properties inherent in these rays themselves, but depend on the mutual relation subsisting between them and the particular diaphanous medium. When the medium is changed, the refraction of one set of rays cannot be safely inferred from that of another. Nay, in the passage among certain media, those rays which are designated as the most refrangible will sometimes be the least refracted. To ascertain correctly, therefore, the index of refraction, it becomes necessary, in each distinct case, to examine the bearing or disposition of the particular species of rays; since the principle, that the refraction of the extreme rays is always proportioned to that of the mean rays, involves a very false conclusion.

When Newton attempted to reckon up the rays of light decomposed by the prism, and ventured to assign the famous number *seven*, he was apparently influenced by some lurking disposition towards mysticism. If any unprejudiced person will fairly repeat the experiment, he must soon be convinced, that the various coloured spaces which paint the spectrum slide into each other by indefinite shadings; he may name four or five principal colours, but the subordinate divisions are evidently so multiplied as to be incapable of enumeration. The same illustrious mathematician, we can hardly doubt, was betrayed by a passion for analogy, when he imagined, that the primary colours are distributed over the spectrum after the proportions of the diatonic scale of music, since those intermediate spaces have really no precise and defined limits. Had prisms of a different kind of glass been used, the distribution of the coloured spaces would have been materially changed. The fact is, that all Newton's prisms being manufactured abroad, consisted of plate or crown glass, formed by the combination of soda, or the mineral alkali, with silicious sand. The refined art of glass-making had only been lately introduced into England, and that beautiful variety called crystal, or flint-glass, which has so long distinguished this country, being produced by the union of a silicious material with the oxyde of lead, was then scarcely known. The original experimenter had not the advantage, therefore, of witnessing the varied effects occasioned by different prisms, which demonstrate, that the power of refraction is not less a property of the peculiar medium than of the species of light itself. He mentions, indeed, prisms formed with water confined by plates of glass; but the few trials which he made with them had evidently been performed with no sufficient attention. In spite of his habitual circumspection, he could not always restrain the propensity so natural to genius, that of hastening to the result, and of trusting to general principles more than to any particular details. But the same indulgent apology will not be conceded to some later authors. It is truly astonishing that systematic writers on optics, in obvious contradiction to the most undoubted discoveries related by themselves, should yet repeat with complacency the fanciful idea of the harmonical composition of light.

Admitting the general conclusion which Newton conceived himself entitled to draw from analogy and concurring experiment, that "the sine of incidence of every ray considered apart, is to the sine of refraction in a given ratio;" it was strictly demonstrable, that no contrary refractions whatever, unless they absolutely restored the pencil to its first direction, could collect again the extreme rays, and produce, by their union, a white light. Thus, let the ratios of the sines of the angles of incidence and refraction of the violet rays in their transit from air to other two denser mediums, be expressed by $1 : M$ and $1 : m$; and the like ratios of the red rays under the same circumstances, by $1 : N$ and $1 : n$; where $M\ m$ and $N\ n$ respectively denote the refracting indices of those extreme rays. It is manifest that the refracting indices, corresponding to the passage of the violet and red rays from the first to the second medium, will be represented by $M-N$, and $m-n$. But by hypothesis, $M : m :: N : n$, and consequently $M : m :: M-N : m-n$; so that the extreme rays would not be still separated and dispersed in proportion to the mean extent of the final refraction. The great philosopher appears to have contemplated with regret the result of his optical principle; and he had the penetration to remark, that if a different law had obtained, the proper combination of distinct refracting media would have corrected the spherical aberration.



With this view, he would propose for the object-glass of a telescope, a compound lens, consisting of two exterior meniscuses of glass, their outsides being equally convex, and their insides of similar but greater concavity, and having the interior space filled with pure water, as in the figure annexed. He gives a rule, though without demonstration, and evidently disfigured or imperfect, for determining the curvature of the two surfaces: "And by this means," he subjoins, "might telescopes be brought to sufficient perfection, were it not for the different refrangibility of several sorts of rays. But, by reason of this different refrangibility, I do not see any other means of improving telescopes by refractions alone, than that of increasing their lengths."

These remarks appeared to preclude all attempts to improve the construction of the refracting telescope. Brightness and range of sight were sacrificed to distinctness. Instead of enlarging the aperture, recourse was had to the expedient of increasing the length of the focus. For nice astronomical observations, telescopes were sought of the highest magnifying powers, and their tubes had by degrees been extended to a most enormous and inconvenient size. But the famous Dutch mathematician Huygens contrived to supersede the use of these in certain cases, by a method which required, however, some address. Many years afterwards the reflecting, or rather catadioptric telescope, of the Gregorian construction, was executed with tolerable perfection. But a long period of languor succeeded the brilliant age of discovery. Not a single advance was made in the science of light and colours, till thirty years after the death of

Huygens.

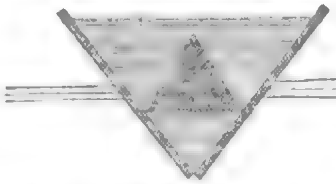
Newton.[1] His immortal *Principia* had not yet provoked discussion, and philosophers seemed inclined to regard the conclusions in the *Treatise of Optics* with silent and incurious acquiescence. This memorable fact not only evinces the danger of yielding, in matters of science, implicit confidence even to the highest authority, but shows, amidst all the apparent bustle of research, how very few original experiments are made, and how seldom these are repeated with the due care and attention.

The impossibility of correcting the colours in object-glasses of telescopes was therefore a principle generally adopted; though some vague hopes, grounded chiefly on the consideration of final causes, were still at times entertained of removing that defect. As the eye consists of two distinct humours, with a horny lens or cornea interposed, it was naturally imagined that such a perfect structure should be imitated in the composition of glasses. This inviting idea is concisely mentioned by David Gregory, the nephew of James, in his little tract on *Dioptrics*. It has also been stated that a country gentleman, Mr Hall of Chesterhall, in Worcestershire, discovered, about the year 1729, the proper composition of lenses by the united segments of crown and flint-glass, and caused a London artist, in 1733, to make a telescope under his directions, which was found on trial to answer extremely well. But whatever might be the fact, no notice was taken of it at the time, nor indeed till very long after, when circumstances had occurred to call forth public attention.

The Newtonian principle was first openly rejected, and a discussion excited, which eventually led to a most valuable discovery in optics, by a foreign mathematician of great celebrity and transcendent talents. Leonard Euler was one of those rare mortals who arise, at distant intervals, to shed unfading lustre on our species. Endowed with a penetrating genius and profound capacity, he was capable of pursuing his abstruse investigations with unremitting ardour and unwearied perseverance. To him the modern analysis stands chiefly indebted for its prodigious extension; and he continued to enrich it in all its departments with innumerable improvements and fine discoveries, during the whole course of a most active, laborious, and protracted life. Unfortunately the philosophical character of Euler did not correspond to his superlative eminence as a geometer. Bred in the school of Leibnitz, he had imbibed the specious but delusive metaphysics of the *sufficient reason*, and of the necessary and absolute constitution of the laws of nature. He was hence disposed in all cases to prefer the mode of investigating *a priori*, and never appeared to hold in due estimation the humbler yet only safe road to physical science, by the method of experiment and induction. Euler expressed the indices of refraction by the powers of a certain invariable root, and fancied that the exponents of those powers are proportional for the several rays in different media. Instead of making, in short, the numbers themselves proportional, as Newton had done, he assigned this property to their logarithms. In the *Berlin Memoirs* for 1747, he inserted a short paper, in which he deducted from his optical principle, by a clear analytical process, conducted with his usual skill, the composition of a lens formed after certain proportions with glass and water, which should remove entirely all extraneous colours, whether occasioned by the unequal refraction of the several rays, or by spherical aberration; and in concluding, he remarked, with high satisfaction, the general conformity of his results with the wonderful structure of the eye.

John Dolland.

But this paper met with opposition in a quarter where it could have been least expected. John Dolland, who had afterwards the honour of completing one of the finest and most valuable discoveries in the science of optics, was born in 1706, in Spitalfields, of French parents, whom the revocation of the edict of Nantes had compelled to take refuge in England, from the cruel persecution of a bigoted and tyrannical court. Following his father's occupation, that of a silk-weaver, he married at an early age; and being fond of reading, he dedicated his leisure moments to the acquisition of knowledge. By dint of solitary application, he made some progress in the learned languages; but he devoted his main attention to the study of geometry and algebra, and the more attractive parts of mixed or practical mathematics. He gave instructions in these branches to his son Peter, who, though bred to the hereditary profession, soon quitted that employment, and commenced the business of optician, in which he was afterwards joined by his father. About this time the volume of the *Berlin Memoirs*, containing Euler's paper, fell into the hands of the elder Dolland, who examined it with care, and repeated the calculations. His report was communicated by Mr Short to the Royal Society in 1752, and published in their Transactions for that year. Dolland, as might well be expected, could detect no mistake in the investigation itself, but strenuously contested the principle on which it was built, as differing from the one laid down by Newton, which he held to be irrefragable. "It is, therefore," says he, rather uncourteously, and certainly with little of the prophetic spirit, "it is, therefore, somewhat strange that any body now-a-days should attempt to do that which so long ago has been demonstrated impossible." The great Euler replied with becoming temper, but persisted in maintaining that his optical principle was a true and necessary law of nature, though he frankly confessed that he had not been able to reduce it yet to practice. The dispute now began to provoke attention on the Continent. In 1754, Klingenstierna, an eminent Swedish geometer, demonstrated that the Newtonian principle is in some extreme cases incompatible with the phenomena, and therefore ought not to be received as an undoubted law of nature. Thus pressed on all sides, Dolland at length had recourse to that appeal which should have been made from the beginning,—to the test of actual experiment. He constructed a hollow wedge with two plates of glass, ground parallel, in which he laid inverted a common glass prism, and filled up the space with clear water, as in the annexed figure.



He now continued to enlarge the angle of the wedge, till the refraction produced by the water came to counterbalance exactly the opposite refraction of the glass, which must obtain whenever an object is seen through the compound prism, without change of direction, in its true place. But, contrary to what he so firmly expected, the external objects appeared glaringly bordered with coloured fringes; as much, indeed, as if they had been viewed through a glass prism with an angle of thirty degrees. It was therefore quite decisive that Newton had not performed his experiment with scrupulous accuracy, and had trusted rather too hastily to mere analogical inference. But to remove every shadow of doubt from the subject, Mr Dolland, finding that large angles were inconvenient for observation, ground a prism to the very acute angle of nine degrees, and adjusted, by careful trials, a wedge of water to the same precise measure of refraction. Combining the opposite refractions as before, he beheld, on looking through the apparatus (as here represented), their various objects real position, but distinctly marked with the prismatic colours. In these experiments, although the mean ray pursues the same undeviating course, the extreme rays which enter parallel with it emerge from the compound prism, spreading out on both sides.

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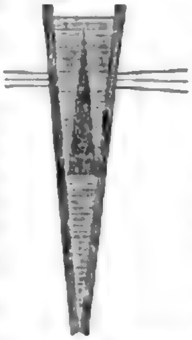
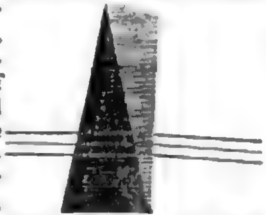
[1] The fine discovery of the apparent aberration of the fixed stars, made by our countryman Dr Bradley in 1729, cannot be justly deemed an exception to this remark. It belongs more to astronomy than to optics, and is indeed merely the result, however important, of the progressive motion of light, detected near sixty years before by the Danish philosopher Roemer, combined with the revolution of the earth in her orbit.

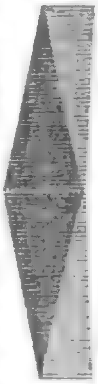


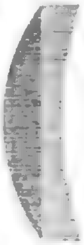
The capital point being completely ascertained, Dolland next tried so to adapt the opposite refractions as to destroy all extraneous colour. This effect he found to take place when the angle of the wedge had been further increased, till the refracting power of the water was to that of the glass in the ratio of five to four. His conclusive experiments were made in 1757, and he lost no time in applying their results to the improvement of the object-glasses of telescopes. Following the proportion just ascertained, he conjoined a very deep convex lens of water with a concave one of glass. In this way he succeeded in removing the colours occasioned by the unequal refraction of light; but the images formed in the foci of the telescopes so constructed, still wanted the distinctness which might have been expected. The defect now proceeded, it was evident, merely from spherical aberration; for the excess of refraction in the compound lens being very small, the surfaces were necessarily formed to a deep curvature.

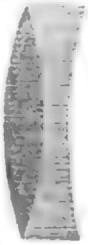
But this partial success only stimulated the ingenious artist to make further trials. Having proved that the separation of the extreme rays, or what has been since termed the *dispersive power*, is not proportioned to the mean refraction in the case of glass and water, he might fairly presume that like discrepancies must exist among other diaphanous substances, and even among the different kinds of glass itself. The charm of uniformity being once dispelled, he was encouraged to proceed, with the confident hope of ultimately achieving his purpose. His new researches, however, were postponed for some time by the pressure of business. But on resuming the inquiry, he found the English crown-glass and the foreign yellow or straw-coloured, commonly called the Venice glass, to disperse the extreme rays almost alike, while the crystal, or white flint-glass, gave a much greater measure of dispersion. On this quarter, therefore, he centred his attention. A wedge of crown and another of flint-glass were ground till they refracted equally, which took place when their angles were respectively 29 and 25 degrees, or the indices of refraction were nearly as 22 to 19; but on being joined in an inverted position, they produced, without changing the general direction of the pencil, a very different divergence of the compound rays of light. He now reversed the experiment, and formed wedges of crown and flint-glass to such angles as might destroy all irregularity of colour by their opposite dispersions. When this condition was obtained, the refractive powers of those wedges of crown and flint-glass were nearly in the ratio of three to two, and consequently the sines of half their angles, or the angles themselves, if small, were as 33 to 19, or nearly as 7 to 4. The rays which enter parallel now escape likewise parallel, but all of them deflected equally from their course.



The appearance was rendered still more conspicuous by repeating the combination of the glass wedges, as in the figure here adjoined. It will be perceived that the pencils of rays which enter at equal distances on both sides of the common junction, must nearly meet in the same point of the axis; for in small arcs the chords are almost proportional to the arcs themselves. This arrangement, indeed, with the projecting wedge of crown-glass in front, represents actually the composition of an object-glass formed of two distinct and opposing lenses, which would produce a similar effect. It was only required to apply a semi-convex lens of crown-glass before a semi-concave one of flint-glass, such that the curvature of the former be to that of the latter nearly as 7 to 4; but with some modifications in this ratio, according to the peculiar qualities of the glass. [The figure annexed represents this combination.] But the depth of the lenses might be diminished, by giving them curvature on both sides. Thus, if a double convex of crown-glass were substituted, of the same power, and consequently with only half the curvature on each side; the lens of flint-glass adapted to it having, therefore, their common surface of an equal concavity, would need, in order to produce the former quantity of refraction, and consequently to maintain the balance of opposite dispersions, a concavity eight times less than before on the other surface. Or if a double concave of flint-glass with half its first depth were used, the front convexity of the lens of crown-glass would be five-sevenths of the former curvature, as here represented. The surface where the two lenses are united may hence have its curvature changed at pleasure; but every alteration of this must occasion corresponding changes in the exterior surfaces.





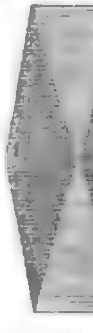


In all these cases, the refraction of the convex pieces being reduced to one-third by the contrary refraction of the concave piece, the focal distance of the compound glass must be triple of that which it would have had singly. But a most important advantage results from the facility of varying the adaptation of the lenses; for, by rightly proportioning the conspiring and counteracting curvatures, it was possible to remove almost entirely the errors arising from spherical aberration. This delicate problem Mr Dolland was the better prepared to encounter, as he had already, in 1753, improved the telescope materially, by introducing no fewer than six eye-glasses, disposed at proper distances, to divide the refraction. The research itself, and the execution of the compound lens, presented peculiar difficulties; but the ingenuity and toilsome exertions of the artist were at length, in 1758, rewarded with complete success. "Notwithstanding," says he, in concluding his paper, "so many difficulties as I have enumerated, I have, after numerous trials, and a resolute perseverance, brought the matter at last to such an issue, that I can construct refracting telescopes, with such apertures and magnifying powers, under limited lengths, as, in the opinion of the best and undeniable judges, who have experienced them, far exceed any thing that has been produced, as representing objects with great distinctness, and in their true colours."

Peter Dolland.

The Royal Society voted to Mr Dolland, for his valuable discovery, the honour of the Copley medal. To this new construction of the telescope Dr Bevis gave the name of *Achromatic* (from α privative, and *χρωμα, colour*), which was soon universally adopted, and is still retained. The inventor took out a patent, but did not live to reap the fruits of his ingenious labours. He died in the year 1761, leaving the prosecution of the business to his son and associate Peter Dolland, who realized a very large fortune by the exclusive manufacture, for many years, of achromatic glasses, less secured to him by the invidious and disputed provisions of legal monopoly, than by superior skill, experience, and sedulous attention. In 1765, the younger Dolland made another and final improvement, to which his father had before advanced some steps. To correct more effectually the spherical aberration, he formed the object-glass of three instead of two lenses, by dividing the convex piece; or he inclosed a concave lens of flint-glass between two convex lenses of crown-glass, as exactly represented in the figure here annexed. He showed a telescope of this improved construction, having a focal length of three feet and a half, with an aperture of three inches and three quarters, to the celebrated Mr Short, who tried it with a magnifying power of one hundred and fifty times, and who, superior to the jealousy of rivalship, and disposed to patronise rising merit, most warmly recommended it, and declared that he found "the image distinct, bright, and free from colours."

What were the curvatures of those distinct component lenses, Dolland has not mentioned, and perhaps he rather wished to conceal them. The Duke de Chaulnes was enabled, however, by means of a sort of micrometer, to ascertain the radii of the several surfaces, in the case of one object-glass of the best composition. He found these radii, beginning with the front lens, to be respectively 311½, 392; 214, 294; 294 and 322½, in French lines, which corresponded, in English inches, to 32·4, 40·8; 22·2, 30·6; 30·6 and 33·5. If these measures were correct, however, it would follow, that the middle lens of flint-glass was not perfectly adapted to the curvature of the lens of crown-glass placed immediately before it. Similar admeasurements have been repeated by others, but the results differ considerably, and no general conclusion can be safely drawn. There is no doubt that the artist varied his practice, according to the nature of the glass which he was obliged to use. The more ordinary proportions for the curvatures of the component lenses would be represented by a truncated prism, formed with a double cluster of wedges, the outer ones having angles of 25° 53′, and 14° 27′, and consisting of crown-glass, and the inner one made of flint-glass, with an inverted angle of 27° 8′. These two wedges of crown-glass would produce the same refraction, it might be shown, as a single one having an angle of 40° 54′; wherefore this refraction will be diminished, by the opposite influence of the wedge of flint glass, in the ratio of 49 to 16, or reduced to nearly one-third.



Thus was achieved, and fully carried into practical operation, the finest and most important detection made in optics since the great discovery of the unequal refraction of the several rays of light. It was drawn forth by a long series of trials, directed with judgment and ingenuity, but certainly very little aided by the powers of calculation. Such a slow tentative procedure was perhaps the best suited, however, to the habits of an artist, and it had at least the advantage of leaving no doubt or hesitation behind it. On this occasion, we cannot help being struck with a remark, that most of those who have ever distinguished themselves in the philosophical arts by their original improvements, were seldom regularly bred to the profession. Both the Dollands, we have seen, began life with plying at the loom; Short had a liberal education, being designed for the Scotish church, but, indulging a taste for practical optics, he afterwards followed it as a trade, in which he rose to pre-eminence; Ramsden, whose ingenuity and exquisite skill were quite unrivalled, was bred a clothier in Yorkshire; Tassie, who revived or created among us the nice art of casting gems, was originally a stone-mason at Glasgow; and Watt, who, by his very happy applications of mechanics, and his vast improvements on the steam-engine, has, more than any other individual perhaps, contributed to the great national advancement, was early an ivory-turner in that same city, and still found pleasure, in his declining years, with the amusement of the lathe. We might easily enlarge this catalogue; but enough has been said to prove the justness of the observation, and it suggests reflections which are not favourable to fixed and systematic plans of education.

Subsequent improvements.

The theory of achromatic telescopes, embraced in all its extent, opened a field of abstruse and difficult investigation. But the English mathematicians at that period, though they might appear to be especially invited to the discussion, very generally neglected so fine an opportunity for the exercise of their genius. They coldly suffered the artists to grope their devious way, without offering to guide their efforts by the lights of science. On the Continent the geometers of the first order were all eager to attempt the solution of problems at once so curious and important. For several years subsequent to 1758, the Transactions of the foreign academies were filled with memoirs on the combination of achromatic lenses, displaying the resources and refinements of the modern analysis, by Euler, Clairaut, and D'Alembert,—by Boscovich, Klingenstierna, Kaestner, and Hennert. On this, as on other occasions, however, we have to regret the want of close union between artists and men of science. Those profound investigations are generally too speculative for any real use; they often involve imperfect or inaccurate data; and the results appear wrapped in such comprehensive and intricate formulæ, as to deter the artist from endeavouring to reduce them into practice. We should have thought it preferable, on the whole, not to load the solution of the main problem with minute conditions, but to aim at a few general rules, which could afterwards be modified in their application according to circumstances. All this might have been accomplished, without scarcely travelling beyond the limits of elementary geometry.

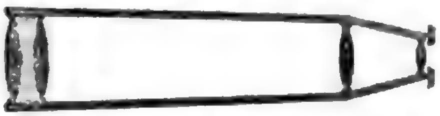
Euler.

Euler and his adherents at Berlin were still not disposed to abandon his favourite optical hypothesis. It was even pretended that Dolland must have owed his success to a nice correction of spherical aberration, and not to any really superior dispersive power belonging to the flint-glass. But that candid philosopher afterwards yielded to the force of reason and testimony; and, collecting his various optical papers, he published, in the successive years 1769, 1770, and 1771, a complete treatise on *Dioptrics*, occupying three quarto volumes, which contain a store of ingenious and elegant disquisitions.

Clairaut. D'Alembert.

The last memoir which Clairaut ever wrote related to achromatic glasses. D'Alembert prosecuted the subject with diligence and ardour; and the volumes of his *Mathematical Opuscules*, published between the years 1761 and 1767, contain some elaborate dioptrical investigations. Among other conclusions which he deduced from his multiplied researches, he proposed a new composition for the object-glass of a telescope, to consist of three lenses, the outmost one being a meniscus of crown-glass, or having a convex and a concave surface, then a meniscus of flint-glass in the middle, and adapted to this, on the inside, a double convex of crown-glass. Of all the continental works, however, which treat of achromatic combinations, the tracts of Boscovich, who possessed a very fine taste for geometry, may be held as the simplest and clearest. We cannot help noticing, by the way, a curious theorem of his concerning the form and arrangement of eye-glasses, which would be free from irregular colours. It is, that the correction will be produced by means of two lenses of the same kind of glass, if separated from each other by an interval equal to half the sum of their focal distances. This principle furnishes a very simple construction for the common astronomical telescope, through which the objects are seen inverted. In the annexed figure, the object-glass, as usual, is achromatic, being composed of two convex lenses of crown-glass, with a concave one of flint-glass fitted between them; but the eye-glass consists of two distinct lenses of crown-glass, both of them convex, and exactly similar, the first having every dimension triple that of the other, and their mutual distance double the focal length of the smaller.

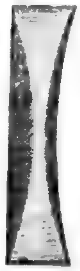
Boscovich.



Supposing, however, that the errors occasioned by spherical aberration were completely removed, the principle of achromatic combination is yet far from being so perfect as it has often been represented. Although the opposite dispersions of the flint and of the crown-glass should bring together the extreme rays, we are not, from this coincidence, warranted to infer that the several intermediate rays would likewise be accurately blended. In fact, a wedge of flint-glass not only separates all the rays much more than a similar one of crown-glass, but divides the coloured spaces after different proportions. While the combined lenses formed of those two kinds of glass give an image entirely free from the red and violet borders, they may still introduce secondary shades of green or yellow, sufficient to cause a certain degree of indistinctness. The mode of correcting this defect would be, to produce a counterbalance of colours, by conjoining several media endued with different refractive and dispersive powers. In these qualities, crown-glass itself admits of some variation, owing to the measure of saline ingredient; but flint-glass differs widely with regard to its optical properties, owing chiefly to the diversified proportion of minium or oxyde of lead which enters into its composition, and partly to the variable admixture of manganese employed to discharge the yellow tint occasioned by the lead. Manifest advantages, therefore, would result from a choice combination of three or more varieties of glass, since both the primary and the secondary deviations of colour would be corrected. Without pretending to any theoretical perfection, every thing really wanted in practice would be thus attained. A series of nice experiments on the optical relations of glass could not fail, by their results, to reward the assiduity of the ingenious artist. He would trace and determine the separate influence exerted on the refractive and dispersive powers by soda in the crown-glass, and by minium and manganese in the flint-glass. It is highly probable, that with perseverance he might discover a vitreous composition better adapted than any yet known for achromatic purposes. It is very generally believed, that the achromatic telescopes now manufactured in London are not of the same excellence with those first made by Peter Dolland. This declension of such a beautiful art has frequently been imputed to the baneful operation of a severe and oppressive system of excise. Whether the new mode of charging the duty on glass at the annealing arch has produced any beneficial effects, we are still to learn.

Dr Blair.

An extensive and ingenious set of experiments on the dispersive powers of different liquids, was undertaken, about the year 1787, and successfully prosecuted for some time afterwards, by Dr Robert Blair, for whom there had been recently created, under royal patronage, the chair of practical astronomy in the University of Edinburgh; one of the very few professorships in that distinguished seminary which have been suffered to remain inefficient and merely nominal. Of these experiments, a judicious account was, in 1790, communicated by their author to the Royal Society of Edinburgh, in a paper drawn up with evident ability, but rather too diffuse, and unnecessarily digressive. Dr Blair had a very small brass prism perforated with a hole, which he filled with a few drops of the liquid to be examined, and confined each end by a plate of glass with parallel surfaces. He then applied, inverted to the prism in succession, a number of glass wedges which he had provided of different angles, and observed, when the bars of the window, seen through this compound prism, appeared colourless, the angle of the wedge now expressed the relative dispersive power of the liquid. This way of experimenting was sufficiently simple, but a more accurate and expeditious method might have easily been devised. For instance, if the prism, furnished with a graduated arch, had remained fixed, and a single glass wedge made to turn upon it, and present successive inclinations to the observer, the refracting angle at which the irregular colours were united could be deduced by an easy calculation. Dr Blair found, by his trials, that muriatic acid, in all its combinations, but particularly with antimony and mercury, shows a very great dispersive power. The essential oils stood the next with regard to that property, though differing considerably among themselves. In Dr Blair's first attempts to improve the achromatic telescope, he conjoined two compound lenses; the one formed with a double concave of crown-glass and a semi-convex of essential oil, and the other composed of a double convex filled with essential oil, of great dispersive power, and of a semi-concave, likewise containing essential oil, but less apt for dispersion. This very complex arrangement seemed, however, to produce the desired effect, not only discharging from the image the extreme fringes of red and violet, but excluding also the intermediate shades of green or yellow. A simpler combination was afterwards used, requiring merely one liquid, composed of muriatic acid joined with antimony, or the triple salt of that acid united in certain proportions to ammonia and mercury. This liquid,



being accurately prepared, was inclosed between two thin glass shells, to form a double convex lens: on the front was applied a semi-convex of crown-glass, and a meniscus of the same material behind, the whole being secured by a glass ring. An object-glass so constructed seemed to perform its office with great perfection, effectually correcting both the primary and the secondary admixture of colours. This kind of eye-glass Dr Blair proposed to denominate *aplanatic* (from α privative, and *πλαναω*, to *err* or *wander*), and he obtained a patent for his invention. The late George Adams, optician in Fleet Street, was intrusted with the fabrication and sale of the telescopes thus constructed. Some of them were said to answer extremely well; but, whether from want of activity on the part of the tradesman, or from defect of temper in the patentee, these instruments never acquired much circulation. It was alleged that the liquid by degrees lost its transparency. Indeed we suspect that there is no combination in which liquids are concerned, which can be judged sufficiently permanent for optical purposes. It seems hardly possible to preclude absolutely the impression of the external air; the liquid must, therefore, have a tendency both to evaporate and to crystallize; and, in the course of time, it will probably, by its activity, corrode the surfaces of the glass.

The manufacture of achromatic telescopes in England furnished, for a long period, a very profitable article of exportation. Even after the introduction of those instruments was prohibited by several foreign governments, the object-glasses themselves, in a more compendious form, were smuggled abroad to a large amount. In fact, no flint-glass of a good quality was then made on the Continent. A very material alteration, however, in that respect, has taken place, at least in France, where the stimulus impressed by the revolution has worked so many changes, and where ingenuity and science, in most of the mechanical arts, have so visibly supplied the scantiness of capital. The French now construct achromatic telescopes, equal, if not superior, to any that are made in England. (B.)

French achromatic telescopes.

ACHTELING, a measure for liquids, used in Germany. Thirty-two *achtelings* make a *heemer;* four *sciltims* or *sciltins* make an *achteling.*

ACHTYRKA, a city of Russia, the capital of the circle of the same name. It contains eight churches, one of which attracts many pilgrims, from an image of the Virgin on it; 1138 houses; and 12,788 inhabitants, who are employed in making woollen cloth, and some other articles. It is situated in Long. 34. 50. E. Lat. 50. 23. N.

ACHYR, a strong town and castle of the Ukraine, subject to the Russians since 1667. It stands on the river Uorsklo, near the frontiers of Russia, 127 miles west of Kiow. Long. 36. 0. E. Lat. 49. 32. N.

ACI, three remarkable towns, very populous, on the seacoast, in the province of Catania, in the island of Sicily. Their names are Aci St Lucia, Aci Catena, and Aci St Filipo. They are defended by the town of St Anna. The inhabitants are occupied in the fishery, or in making wine, and amount to 9200 persons.

ACICANTHERA, in *Botany*, the trivial name of a species of RHEXIA.

ACICULÆ, the small pikes or prickles of the hedgehog, *echinus marinus, &c.*

ACIDALIUS, VALENS, would, in all probability, have been one of the greatest critics of modern times, had he lived longer to perfect those talents which nature had given him. He was born at Witstock, in Brandenburg; and having visited several academies in Germany, Italy, and other countries, where he was greatly esteemed, he afterwards took up his residence at Breslaw, the metropolis of Silesia. Here he remained a considerable time, in expectation of some employment; but nothing offering, he turned Roman Catholic, and was chosen rector of a school at Niessa. It is related, that about four months after, as he was following a procession of the host, he was seized with a sudden phrenzy; and being carried home, expired in a very short time. But Thuanus tells us, that his excessive application to study was the occasion of his untimely death; and that his sitting up in the night composing his *Conjectures on Plautus,* brought upon him a distemper which carried him off in three days, on the 25th of May 1595, having just completed his 28th year. He wrote a Commentary on Quintus Curtius; also, Notes on Tacitus, on the twelve Panegyrics, besides speeches, letters, and poems. His poetical pieces are inserted in the *Deliciæ* of the German poets, and consist of epic verses, odes, and epigrams. A little work, printed in 1595, under the title of *Mulieres non esse homines, i. e.* "That women are not thinking and reasonable beings," was falsely ascribed to him. M. Baillet has given him a place among his *Enfans Célèbres;* and says, that he wrote a comment upon Plautus when he was but 17 or 18 years old, and that he composed several Latin poems at the same age.

ACIDALUS, a fountain in Orchomenus, a city of Bœotia, in which the Graces, who are sacred to Venus, bathed. Hence the epithet *Acidalia,* given to Venus.

ACIDITY, that quality which renders bodies acid.

ACIDOTON, in *Botany*, the trivial name of a species of ADELIA.

ACIDS, in *Chemistry*, a class of substances which are distinguished by the following properties:—

1. When applied to the tongue, they excite that sensation which is called *sour* or *acid.*

2. They change the blue colours of vegetables to a red. The vegetable blues employed for this purpose are generally tincture of litmus and syrup of violets or of radishes, which have obtained the name of *re-agents* or *tests.* If these colours have been previously converted to a *green* by alkalies, the acids restore them.

3. They unite with water in almost any proportion.

4. They combine with all the alkalies, and most of the metallic oxides and earths, and form with them those compounds which are called *salts.*

It must be remarked, however, that every acid does not possess all these properties; but all of them possess a sufficient number of them to distinguish them from other substances. And this is the only purpose which artificial definition is meant to answer. See CHEMISTRY.

ACIDULÆ. Mineral waters that are brisk and sparkling, without the action of heat, are thus named; but if they are hot also, they are called THERMÆ.

ACIDULATED, a name given to medicines that have an acid in their composition.

ACIDULOUS denotes a thing that is slightly *acid:* it is synonymous with the word *sub-acid.*

ACIDUM AERRUM, the same with *fixed air;* or, in modern chemistry, *carbonic acid.*

ACIDUM pingue, an imaginary acid, which some German chemists supposed to be contained in fire, and by combining with alkalies, lime, &c. to give them their caustic properties; an effect which is found certainly to depend on the loss of their carbonic acid.

ACILIUS GLABRIO, Marcus, consul in the year of Rome 562, and 211 years before the Christian era, distinguished himself by his bravery and conduct in gaining a complete victory over Antiochus the Great, king of Syria, at the Straits of Thermopylæ in Thessaly, and on several other occasions. He built the temple of Piety at Rome, in consequence of a vow which he made before this battle. He is mentioned by Pliny, Valerius Maximus, and others.

ACINODENDRUM, in *Botany*, the trivial name of a species of Melastoma.

ACINOS, in *Botany*, the trivial name of a species of Thymus.

ACINUS, or Acini, the small protuberances of mulberries, strawberries, &c., and by some applied to grapes. Generally it is used for those small grains growing in bunches, after the manner of grapes, as *ligustrum*, &c.

ACIS, in *Mythology*, the son of Faunus and the nymph Simæthis, was a beautiful shepherd of Sicily, who being beloved by Galatea, Polyphemus the giant was so enraged, that he dashed out his brains against a rock; after which Galatea turned him into a river, which was called by his name.—The Sicilian authors say, that Acis was a king of this part of the island, who was slain by Polyphemus, one of the giants of Ætna, in a fit of jealousy.

Acis, a river of Sicily, celebrated by the poets, running from a very cold spring, in the woody and shady foot of Mount Ætna, for the space of a mile eastward into the sea, along green and pleasant banks, with the speed of an arrow, from which it takes its name. Its waters are now impregnated with sulphureous vapours, though formerly they were celebrated for their sweetness and salubrity, and were held sacred by the Sicilian shepherds.

> Quique per Ætnæos Acis petit æquora fines,
> Et dulci gratam Nereïda perluit unda. Sil. Ital.

It is now called *Il Fiume Freddo, Aci, Iaci*, or *Chiaci*, according to the different Sicilian dialects: Antonine calls it *Acius*. It is also the name of a hamlet at the mouth of the *Acis*.

ACKERMANN, John Christian Gottlieb, a very learned physician and professor of medicine, was born at Zeulenrode in Upper Saxony, in the year 1756. Having acquired the rudiments of his medical education under the tuition of his father, who was also a physician, he proceeded to Jena and to Göttingen, and studied under Baldinger and Heyne. On quitting the latter university, he established himself in practice at Stendal, the numerous manufactories of which place enabled him to contribute many important observations to the translation of Rammazzini's *Treatise of the Diseases of Artificers*, which he published in 1780-83. After practising here several years, he was appointed public professor in ordinary of medicine in the university of Altorf in Franconia, which office he continued to fill with great repute to the time of his death, which took place in 1801. All Dr Ackermann's works display great erudition. To the history of medicine he contributed many valuable articles; the disquisitions, in particular, on the lives and writings of Hippocrates, Galen, Theophrastus, Dioscorides, Aretæus, and Rufus Ephesius, which he furnished to Harles's edition of Fabricius's *Bibliotheca Græca*, are justly esteemed as masterpieces of critical research. As a practitioner he appears to have possessed no mean talents for observation; though he has been accused, and, it must be acknowledged, not without reason, of betraying occasionally a predilection for antiquated hypotheses. Besides various translations of English, French, and Italian medical authors, which were published, for the most part, previously to his removal to Altorf, the following works have appeared under his name:—De Trismo Commentatio Medica. 1775, 8vo. 2. De Dysenteriæ Antiquitatibus liber bipartitus. 1777, 8vo. 3. Ueber die Krankheiten der Gelehrten. 1777, 8vo. 4. The Life of John Conrad Dippel, in German. 1781, 8vo. 5. Parabilium Medicamentorum Scriptores Antiqui: Sexti Placiti Papyriensis de Medicamentis ex Animalibus Liber; Lucii Apuleii de Medicaminibus Herbarum Liber, cum Notis. 1788, 8vo. 6. H. D. Gaubii Institutiones Pathologiæ Medicæ, cum Additamentis J. C. G. A. 1787, 8vo. 7. Regimen Sanitatis Salerni, Studii Medici Salernitani Historia Præmissa. 1790, 8vo. 8. Institutiones Historiæ Medicinæ. 1792, 8vo. 9. Institutiones Therapiæ Generalis. 1793–5, 2 tom. 8vo. 10. Handbuch der Kriegsarzneykunde. 1794–5, 2 tom. 8vo. 11. Opuscula ad Historiam Medicinæ pertinentia. 1797, 8vo. 12. Bemerkungen über die Kentniss und Kur einiger Krankheiten. 1794–1800, 8vo. 13. Pathologische-praktische Abhandlung über die Blähungen, für Aertze und Kranke bestimmt. 1800, 8vo.

ACKNOWLEDGEMENT, in a general sense, is a person's owning or confessing a thing; but more particularly, is the expression of gratitude for a favour.

Acknowledgement-Money, a certain sum paid by tenants, in several parts of England, on the death of their landlords, as an acknowledgement of their new lords.

ACLIDES, in Roman antiquity, a kind of missile weapon, with a thong affixed to it, by which it was drawn back. Most authors describe it as a sort of dart or javelin; but Scaliger makes it roundish or globular, and full of spikes, with a slender wooden stem to poise it by. Each warrior was furnished with two.

ACLOWA, in *Botany*, a barbarous name of a species of Colutea. It is used by the natives of Guinea to cure the itch: they rub it on the body as we do unguents.

ACME, the top or height of any thing. It is usually applied to the maturity of an animal just before it begins to decline; and physicians have used it to express the utmost violence or crisis of a disease.

ACMELIA, in *Botany*, the trivial name of a species of Spilanthus.

ACNIDA, Virginian Hemp.

ACNUA, in Roman antiquity, signified a certain measure of land, about an English rood, or fourth part of an acre.

ACO, a town of Peru, in South America. It is also the name of a river in Africa, which rises in the Abyssinian mountains, runs in a south-east course, and discharges itself into the Indian Ocean.

ACOEMETÆ, or Acoemeti, men who lived without sleep; a set of monks who chanted the divine service night and day in their places of worship. They divided themselves into three bodies, who alternately succeeded one another, so that the service in their churches was never interrupted. This practice they founded upon the precept, *Pray without ceasing*. They flourished in the East about the middle of the fifth century. There are a kind of acoemeti still subsisting in the Romish church, viz. the religious of the holy sacrament, who keep up a perpetual adoration, some one or other of them praying before the holy sacrament day and night.

ACOLUTHI, or Acoluthists, in antiquity, was an appellation given to those persons who were steady and immovable in their resolutions; and hence the Stoics, because they would not forsake their principles nor alter their resolutions, acquired the title of *acoluthi*. The word is Greek, and compounded of α privative, and κελευθος, *way*; as never turning from the original course.

Acoluthi, among the ancient Christians, implied a peculiar order of the inferior clergy in the Latin church, for they were unknown to the Greeks for above 400 years. They were next to the subdeacon; and we learn from the fourth council of Carthage, that the archdeacon, at their ordination, put into their hands a candlestick with a taper, giving them thereby to understand that they were appointed to light the candles of the church; as also an empty pitcher, to imply that they were to furnish wine for the eucharist. Some think they had another office, that of attending the bishop wherever he went. The word is Greek, and compounded of α privative, and κωλυω, to *hinder* or *disturb*.

ACOLYTHIA, in the Greek church, denotes the office or order of divine service; or the prayers, ceremonies, hymns, &c. whereof the Greek service is composed.

ACOMINATUS, Nicetas, was secretary to Alexius Comnenus and to Isaacus Angelus successively. He wrote a history from the death of Alexius Comnenus in 1118, where Zonaras ended his, to the year 1203, which has gone through many editions, and has been much applauded by the best critics.

ACONCROBA, in *Botany*, the indigenous name of a plant which grows wild in Guinea, and is in great esteem among the natives for its virtues in the small-pox. They give an infusion of it in wine. The leaves of this plant are opaque, and as stiff as those of the philyrea; they grow in pairs, and stand on short foot-stalks; they are small at each end, and broad in the middle; and the largest of them are about three inches in length, and an inch and a quarter in breadth in the middle. Like those of our bay, they are of a dusky colour on the upper side, and of a pale green underneath.

ACONITI, in antiquity, an appellation given to some of the Athletæ, but differently interpreted. Mercurialis understands it of those who only anointed their bodies with oil, but did not smear themselves over with dust, as was the usual practice.

ACONITUM, Aconite, Wolfsbane, or Monks-hood.

ACONTIAS, in *Zoology*, an obsolete name of the *anguis jaculus*, or dart-snake, belonging to the order of *amphibia serpentes*.

ACONTIUM, ακοντιον, in Grecian antiquity, a kind of dart or javelin, resembling the Roman pilum.

ACONTIUS, a young man of the island Cea, who having gone to Delos to see the sacred rites which were performed there by a crowd of virgins in the temple of Diana, fell desperately in love with Cydippe; but not daring to ask her in marriage, on account of the meanness of his birth, insidiously threw down at her feet an apple, on which were inscribed these words,

> Me tibi nupturam (felix est nomen) Aconti,
> Juro, quam colimus, numina magna deæ.

Or, according to others,

> Juro tibi sanctæ per mystica sacra Dianæ,
> Me tibi venturam comitem, sponsamque futuram.

The virgin having taken up the apple, inadvertently read the words, and thus apparently bound herself by a promise; for by law, every thing uttered in that temple was held to be ratified. When her father, a little after, ignorant of what had happened, betrothed her to another man, she was suddenly seized with a fever; whereupon Acontius sent her a letter (expressed by Ovid, *Ep.* 20.) to persuade her that her fever was caused by Diana for not having fulfilled the promise which she had made to him in the temple of that goddess. Cydippe therefore resolved to comply with the wishes of Acontius, even against the inclination of her father. Her answer is the subject of Ovid's 21st epistle. (Adam's *Clas. Biog.*)

Acontius, *James*, a philosopher, civilian, and divine, born at Trent in the sixteenth century. He embraced the reformed religion; and coming into England in the reign of Queen Elizabeth, he was favourably received and much honoured by that princess, which he acknowledges in a book dedicated to her. This work is his celebrated *Collection of the Stratagems of Satan*, which has been often translated, and passed through many editions.

ACORN, the fruit of the oak-tree.

Acorn, in sea language, a little ornamental piece of wood, fashioned like a cone, and fixed on the uppermost point of the spindle, above the vane, on the mast head. It is used to keep the vane from being blown off from the spindle in a whirlwind, or when the ship leans much to one side under sail.

ACORUS, Calamus Aromaticus, Sweet Flag, or Sweet Rush.

Acorus, in the *Materia Medica*, a name sometimes given to the great galangal.

Acorus, in *Natural History*, blue coral. The true sort is very scarce; some, however, is fished on the coasts of Africa, particularly from Rio del Re to the river of the Camarones. This coral is part of the merchandise which the Dutch trade for with the Camarones: that of the kingdom of Benin is also very much esteemed. It grows in form of a tree on a rocky bottom.

ACOSTA, Joseph d', a celebrated Spanish author, was born at Medina del Campo about the year 1539. In 1571, he went to Peru as a Provincial of the Jesuits, having entered into that society in his fourteenth year. After a residence in America of seventeen years, he returned to his native country, and became in succession visitor for his order of Arragon and Andalusia, superior of Valladolid, and rector of Salamanca; in which city he died in February 1600.

About ten years before his death, he published at Seville, in one volume quarto, his valuable work entitled *Historia Natural y Moral de las Indias*. The first two books of this history were written during his residence in Peru, and were published separately after his return to Spain, in the Latin language, with this title; *De Natura Novi Orbis, libri duo*. He afterwards translated them into Spanish, and added to them other five books, the whole composing a connected work, under the first mentioned title. This work, which has been translated into all the principal languages of Europe, is written on a regular and comprehensive plan. The first five books are employed upon the physical geography and natural history of that portion of America which had been conquered or discovered by the Spaniards; the fifth and sixth, upon the manners, religion, and civil institutions of the inhabitants; and the last, upon the history of the Mexicans, from their origin till the period of their subjugation. Dr Robertson pronounces Acosta "an accurate and well-informed writer." Among other things, he treats the subject of climate in a more philosophical manner than could have been expected in a writer of that age, and of his order. "He was the first philosopher," says the eminent author just quoted, "who endeavoured to account for the different degrees of heat in the old and new continents, by the agency of the winds which blow in each;"—a theory which was afterwards adopted by Buffon, and supported with his usual powers of copious and eloquent illustration. In the course of these discussions, Acosta frequently comments upon the opinion of Aristotle and other ancient philosophers, that the middle zone of the earth was so much scorched by the rays of the sun as to be destitute of moisture and verdure, and totally uninhabitable. This notion seems to have held its ground in the Schools, even after the discovery of South America had disclosed the magnificent scenery and stupendous rivers of the tropical regions. It appears to have been thought a sort of impiety to question a dogma of such ancient date, and sanctioned by the assent of all the school divines. We learn, from a curious passage in Osborne's *Miscellany of Essays, Paradoxes, and Letters*, that the exposing of this ancient error in geography was one of the circumstances which brought upon the famous Sir Walter Raleigh the charge of general scepticism and atheism. Acosta mentions, that, when he went to America, his mind was deeply imbued with frightful notions of this supposed burning zone, and that his surprise was great when he beheld it so different from what it had been represented in the "ancient and received philosophy." "What could I do then," says he, "but laugh at Aristotle's meteors and his philosophy?"

Having said thus much in regard to one of the most curious and valuable of the earlier accounts of the new world, it may be proper to add, that, in speaking of the conduct of his countrymen, and the propagation of their faith, Acosta is in no respect superior to the other prejudiced and fanatical writers of his country and age. Though he acknowledges that the career of Spanish conquest was marked by the most savage cruelty and oppression, he yet represents this people as the chosen instruments of the Deity for spreading the truths of the gospel among the nations of America. He accordingly recounts a variety of miracles, as a proof of the constant interposition of Heaven, in favour of these merciless and rapacious invaders. It will appear from the following curious passage, that he even makes the great enemy of mankind himself a co-operator in that scheme of conversion for which he represents the Spaniards to have been predestined. "That," says he, "which is difficult in our law to believe, has been made easy among the Indians; because the *Devil* had made them comprehend even the self-same things which he had stolen from our evangelical law,—as their manner of confession, their adoration of three in one, and such like; the which, against the will of the enemy, have holpen for the easy receiving of the truth."

Besides his History, Acosta wrote the following works: 1. De Promulgatione Evangelii apud Barbaros. 2. De Christo Revelato. 3. De Temporibus Novissimis, libri vi. 4. Concionum tomi iii. All of these works were, in their day, frequently reprinted; but it is only by his History that his name is now known in the literary world. The English translation, from which we have taken the preceding extracts, was published at London in quarto in the year 1604, and is now rather a scarce book.

Acosta, *Uriel*, a Portuguese, born at Oporto towards the close of the sixteenth century. He was educated in the Romish religion, which his father also professed, though descended from one of those Jewish families who had been in a manner forced to receive baptism. Uriel had a liberal education. He was instructed in several sciences, and at last he studied law. He had by nature a good temper and mild disposition; and religion had made so deep an impression on his mind, that he ardently desired to conform to all the precepts of the church, to avoid eternal death, which he dreaded. He applied with great assiduity to reading the Scriptures and other religious books, carefully consulting also the creed of the confessors; but the more he studied, the more difficulties occurred, which perplexed him at length to such a degree, that, being unable to solve them, he fell into the most terrible agonies of mind. He thought it impossible to fulfil his duty with regard to the conditions required for absolution; so that he despaired of salvation, if he could find no other means of attaining it; and it proved difficult to abandon a religion in which he had been bred up from his infancy, and which had been deeply rooted in his mind. However, he began to inquire whether several particulars mentioned about the other life were agreeable to reason; and, upon inquiry and deliberation, he imagined that reason suggested many arguments against them. Acosta was about two and twenty when he was thus perplexed with doubts; and the result of his reflections was, that he could not be saved by the religion which he had imbibed in his infancy. Nevertheless he prosecuted his studies in the law, and at the age of five and twenty was made treasurer in a collegiate church. Being naturally of a religious disposition, and now made uneasy by the popish doctrines, he began to study Moses and the prophets; where he thought he found more satisfaction than in the gospel, and at length became convinced that Judaism was the true religion: and, as he could not profess it in Portugal, he resolved to leave the country. He accordingly resigned his place, and embarked for Amsterdam with his mother and brothers, whom he had ventured to instruct in the principles of the Jewish religion, even when in Portugal. Soon after their arrival in Amsterdam they became members of the synagogue, were circumcised according to custom, and he changed his name of Gabriel for that of Uriel. A little time was sufficient to show him, that the Jews did not, either in their rites or morals, conform to the law of Moses, of which he could not but declare his disapprobation: but the chiefs of the synagogue gave him to understand, that he must exactly observe their tenets and customs, and that he would be excommunicated if he deviated in the least from them. This threat, however, had no effect; for he thought it would be a most mean behaviour in him, who had left the sweets of his native country purely for liberty of conscience, to submit to a set of Rabbis without any proper jurisdiction; and that it would show both want of courage and piety if he should stifle his sentiments on this occasion. He therefore persisted in his invectives, and in consequence was excommunicated; the effect of which was such, that his own brothers durst not speak to him, nor salute him when they met him in the streets. Finding himself thus situated, he wrote a book in his justification, wherein he endeavours to show that the rites and traditions of the Pharisees are contrary to the writings of Moses; and soon after adopted the opinion of the Sadducees, for he had worked himself up to a belief that the rewards and punishments of the old law relate only to this life, and this because Moses nowhere mentions the joys of heaven or the torments of hell. His adversaries were overjoyed at his embracing this tenet, foreseeing that it would tend greatly to justify, in the sight of Christians, the proceedings of the synagogues against him. Before his book was printed, there appeared a piece upon the immortality of the soul, written by a physician, who omitted nothing he could suggest to make Acosta pass for an atheist. The very children were encouraged to insult him in the streets, and to batter his house with stones; all which, however, did not prevent him from writing a treatise against the physician, wherein he endeavoured to confute the doctrine of the soul's immortality. The Jews now made application to the magistrates of Amsterdam, and informed against him, as one who wanted to undermine the foundation of both Jewish and Christian religions. He was thrown into prison, but bailed out within a week or ten days after; however, all the copies of his works were seized, and he himself fined in 300 florins. Nevertheless, he proceeded still farther in his scepticism. He now began to examine whether the law of Moses came from God; and he supposed he had at length found reasons to convince him that it was only a political invention. Yet instead of drawing from thence this inference, "I ought not to return to the Jewish communion," he thus argued with himself: "Why should I continue all my life cut off from the communion, exposed to so many inconveniences, especially as I am in a country where I am a stranger, and unacquainted with the language? Had I not better play the ape among apes?" He accordingly returned to the Jewish church, after he had been excommunicated fifteen years; and, after having made a recantation of what he had written, subscribed every thing as they directed. A few days after, he was accused by a nephew, who lived in his house, that he did not, as to his eating and many other points, conform to the laws of the synagogue. This accusation was attended with very bad consequences; for a relation of Acosta, who had got him reconciled to the synagogue, thought he was in honour bound to persecute him with the utmost violence. The Rabbis and the rest of the Jews were animated with the same spirit, especially when they found that Acosta had dissuaded two Christians, who had come from London to Amsterdam, from turning Jews. He was summoned before the grand council of the synagogue; when it was declared to him, that he must again be excommunicated, if he did not give such satisfaction as should be required. He found the terms so hard that he could not comply. The Jews thereupon again expelled him from their communion; and he afterwards suffered various hardships and great persecutions, even from his own relations. After remaining seven years in a most wretched situation, he at length declared he was willing to submit to the sentence of the synagogue, having been told that he might easily accommodate matters; for that the judges, being satisfied with his submission, would soften the severity of the discipline. Acosta, however, was caught in a snare: for they made him undergo the most rigorous penance. These particulars relating to the life of Acosta are taken from his work entitled *Exemplar Humanæ Vitæ*, published and refuted by Limborch. It is supposed that he composed it a few days before his death, after having determined to lay violent hands on himself. He executed this horrid resolution a little after he had failed in his attempt to kill his principal enemy; for the pistol with which he intended to shoot him as he passed his house having missed fire, he immediately shut the door, and shot himself with another pistol. This happened at Amsterdam, but in what year is not exactly known.

ACOSTAN, a mountainous island in the north seas, between Asia and America, observed by Captain Cook.

ACOUSMATICI, sometimes also called *Acoustici*, in Grecian antiquity, such of the disciples of Pythagoras as had not completed their five years' probation.

ACOUSTIC, in general, denotes any thing that relates to the ear, the sense of hearing, or the doctrine of sounds.

Acoustic Disciples, among the ancient Pythagoreans, those more commonly called ACOUSMATICI.

Acoustic Ducts, in *Anatomy*, the same with *meatus auditorius*, or the external passage of the ear.

Acoustic Vessels, in the ancient theatres, were a kind of vessels made of brass, shaped in the bell fashion, which being of all tones within the pitch of the voice, or even of instruments, rendered the sound more audible, so that the actors could be heard through all parts of theatres which were even 400 feet in diameter.

ACOUSTICS.

ACOUSTICS, that branch of Natural Philosophy which treats of the nature of Sound, and the laws of its production and propagation. It is a subject extremely curious and interesting, and has at all times excited much attention among philosophers. In treating it here, it was at first our intention to embody the original article in this Encyclopædia with that which was contributed for the last Supplement by Professor Leslie. On considering, however, that the latter embraces in itself a general outline of the whole science;—that it is distinguished, like all the other productions of that philosopher, by soundness, depth, and striking originality; and that any changes even in the arrangement might destroy its peculiar character;—we have thought it best to preserve this valuable essay entire. It accordingly forms the *Second* Part of this Treatise; the *First* being devoted to the explanation of the more elementary principles; and the *Third* to some details supplemental to those contained in the Second.

PART I.

Nature of sound.

In regard to the nature of sound, the slightest attention is sufficient to convince us, that this sensation is not owing to the action of any peculiar substance or power, like Heat, Light, or Electricity, but arises merely from a certain mechanical action; a sort of concussion or agitation which takes place among the bodies from which the sound is emitted. Every noise or sound with which we are acquainted is accompanied with some action of this kind. The report of a cannon, for example, produces a concussion which shakes the ground under and to a great distance around it. In the same manner the rushing of waters, the roar of the sea, the whistling of the wind as it breaks on the trees or other obstacles which oppose it; the rattling of carriages, and that infinite diversity of sounds which arises in general from the percussion of one object against another: in all these cases there is a sensible and indeed violent agitation among the bodies from which the sound proceeds. In musical sounds, which are of a softer nature, we still also observe an agitation, which is often felt communicating itself to the surrounding bodies. If, for example, we stand under or near a pianoforte when it is sounding, we feel a sensible tremor in the floor of the apartment. If we lay the finger or hand on the instrument, or touch any other, such as a violin, when it is sounding, or a bell, we feel the same sort of tremor in every part of them; and this is well observed in the case of any glass vessel, such as a tumbler or large cup. If we strike it so as to make it sound, and then touch the mouth of it with the finger, we feel a sensible tremor in the glass; and when this internal agitation is stopped, as it generally is by the contact with the finger, then the sound ceases along with it. If there be any water in the glass, the tremor is observed communicating itself to the water, and putting the whole mass in motion. This is particularly well observed when we make the glass sound by rubbing the edge of it with the finger, as is done in the musical glasses. When the sound is brought fully out, the water is violently agitated; and as the sound declines, the agitation declines along with it. Such agitation then, in the sounding body, being the constant accompaniment of sound, ceasing when it ceases, and again beginning when the sound recommences; and there being no other circumstance which can be discovered accompanying the sound in this manner; there can be no doubt that this is in some way or other the cause of the sensation.

Transmitted through the medium of the air.

But how can any mere agitation or imperceptible tremor among bodies, and these at a distance, affect the organ of hearing? It is through the medium of the surrounding air. We have seen how the tremor of the piano-forte is communicated to the floor of the apartment, and is there felt under our feet. This communication can only take place through the legs of the instrument, which form the only connection between it and the floor. Through these, therefore, it is somehow conveyed; and in the same manner every tremor of this kind creates an agitation in the surrounding air, through which it is conveyed from the centre of agitation in all directions until it reaches the ear, and there striking or agitating the organ, produces the sensation of sound. That such agitation does take place in the air, we have a striking proof in the discharge of artillery, which often produces such an agitation as to shatter the glass in the windows of adjoining houses. The ear then forms merely a sort of organ of touch, but of such exquisite sensibility that it becomes affected by the slightest agitation in the fluid atmosphere by which it is surrounded. But this fluid is continually agitated, and in a thousand different ways, by the various motions and actions which are continually going on among the bodies on the surface of the earth. Every agitation of this kind communicates itself to the surrounding atmosphere; it is by it conveyed and propagated in all directions from the centre of agitation, somewhat like what we observe in a smooth surface of water when a stone is thrown into the middle of it;—a series of little waves are observed arising and propagating themselves in concentric circles from the centre of agitation on all sides. In a similar manner every agitation in the aërial medium propagates its influence in all directions, and from these varied impressions arise all those diversities of sound which affect the ear.

This idea of the process of hearing and of the cause of sound is certainly very remarkable, and well calculated to excite our surprise and curiosity, when we think of that infinite variety which we observe; single sounds, varying in intensity from the gentlest tap to the noise and violence of an explosion; continued sounds, from the ripple of waters to the roar of the cataract; strains of melody which enchant the ear, rising from grave to acute, and falling again to the lowest in the compass; or those harsher notes which only grate by their discord. Can it be possible that all these diversities arise from agitations in the air, differing only in the manner in which they strike the ear, in the force and quickness of their action, or in the regularity of their succession? What incredible sensibility in this organ, to perceive and be moved by such imperceptible shades of gradation, and to recognise such infinite diversities in kind! The powers of the eye in discriminating the minutest shades of colour justly excite our astonishment; but each colour presents a peculiar modification of light. The powers of the ear must appear still more extraordinary, if every sensation in it arises merely from a mechanical agitation of the same nature in every case, but only differing in the force of the impulse. Yet this is really the case; and the more we examine into the subject, the more clearly does it appear demonstrable by the laws of geometry and mechanics.

That the air is necessary for the production of sound, is clearly proved by the beautiful experiment of inclosing a bell within the receiver of an air-pump, and then exhausting the air. As the process of exhaustion proceeds, the sound is observed to become continually fainter and fainter, until at last it nearly dies away altogether. The bell, however, continues to ring, at least the hammer continues to strike, and thereby to agitate the bell as before; and yet no sound is emitted, plainly because there is no medium to convey the agitation to the ear. If the sound in this experiment cannot be altogether extinguished, this will be found to arise from the impracticability of exhausting the air altogether out of the receiver, and also of insulating completely the bell from the plate of the air-pump on which it stands, the support serving to convey the sound even after the air is exhausted. A very good mode of performing this experiment is, to have a bell with a small piece of clock-work attached to it, which strikes at regular intervals, and with a tone of uniform intensity.

Mode in which sound is propagated.

In order to conceive the mode in which sound is propagated through the air, let us consider what takes place when we move a series of balls ranged in a line on a table, or suspended by threads. If we strike the one end of the line by impelling a ball against it, it is only the ball at the other end which appears to be affected. This flies off from the rest, and leaves them almost stationary. The intermediate balls, therefore, serve merely to transmit the impulse from the one end to the other of the series. In the same manner it is that the agitation or impulse from which sound arises is transmitted through the air. This fluid, like every other body, consists of an infinite number of little particles; a single series of which may be represented to us by the balls in the above example. These particles are not even in contact with each other; they are separated by minute intervals, but are yet connected together by attractive and repulsive forces, which tend to retain them perpetually in equilibrio. In every case, therefore, there is in reality a chain of such particles reaching from the sounding body to the ear. The former by its agitation strikes that particle which is next it, the intermediate ones serve to convey the impression, and the last one, flying off, strikes the sentient organ of hearing. The process is exactly similar to that of impulse along a series of balls, only that in the case of the air, the intermediate particles, instead of remaining at rest, move each of them backwards and forwards by a very minute interval; the first communicating its motion to the second, the second to the third, and so on to the last; each performing a slight oscillatory movement, which advances from the beginning to the end of the series.

We now see at once the cause of a remarkable and well-known fact, that the propagation of sound is not instantaneous; it requires time to advance from the sounding body to the ear, as is daily observed and illustrated in the discharge of fire-arms. If the distance be at all considerable, a sensible interval is always observed to elapse between the flash and the report. The light flies almost instantaneously, but the report is retarded according to the distance; as is also seen in many other cases: when we observe the workmen, for example, cutting up large stones in any quarry; if we stand at a little distance, we see invariably and distinctly the blow of the hammer on the stone before the sound reaches the ear. These and other similar facts leave no doubt that sound advances only at a certain rate, and invariably requires time for its propagation; and the reason is, that each aërial particle in the chain of communication must have a certain time, minute no doubt, but still definite, to perform its oscillation, and communicate its motion to the rest; and thus the advance of the agitation and of the sound is retarded, and only sweeps with a regulated progression along the line.

Sound propagated on all sides.

It is not through one series of particles merely that the oscillatory motion is communicated. The sounding body having every part of it in a state of agitation, generally acts all round; but even though it were only to act in one direction, the impulse, once begun at the centre, is propagated in all directions; for though only one particle were originally affected, so intimately are they all connected together and united into a system by their mutual attractions and repulsions, that this cannot advance in any degree forwards without affecting the particles on each side: these affect what are before and around them; and thus the impulse is communicated, and diffuses itself on all sides. These lateral impressions would appear to be necessarily somewhat enfeebled, yet it is one remarkable characteristic of such oscillatory movements, that, like the vibrations of a distended cord, or the oscillations of a pendulum in a cycloid, they are all performed in the same time, however minute or however extended. The lateral impressions, therefore, though ever so feeble, are yet transmitted with the same rapidity as the direct; the sound may be weakened, and we often observe it so;—a speaker, for example, is always best heard in front; the report of a cannon is also loudest in that direction, but still the sound is heard at the very same instant all round.

It is owing to this diffusion of the agitation in all directions, the original impression being spread out, not merely in concentric circles like the little waves in a pool, but expanding continually, if we can conceive it, into a wider and wider concentric sphere,—it is owing to this that every sound decreases so rapidly as we recede from it, and at last dies away altogether in the distance. It requires a very loud sound to be heard at the distance of a mile, yet we have heard the guns of Edinburgh Castle at the distance of 20 miles; and the noise occasioned by the falls of Niagara is said to be often heard at 60 miles. That this diffusion of the agitating impression is the true cause of the diminution of the sound, is proved in a remarkable manner by confining the air on all sides, as in a tube. M. Biot, in his *Traité de Physique*, gives an account of some very interesting experiments made by himself in the train of cast-iron pipes used for the conducting of water into Paris, and which extended about 2860 feet, thus including in their interior a cylindrical column of air upwards of half a mile in length; at which distance a person standing at one end of the pipes, and speaking within, could be easily heard at the other. "The lowest voice," says he, "was heard at this distance so as to distinguish completely the words, and to establish a continued conversation. I wished to ascertain at how low a tone the voice ceased to become audible, and I could not reach it. Words spoken as low as when one whispers in the ear of another were heard and appreciated; so that if we wished to speak so as not to be understood, there was only one way of doing it, and that was not to speak at all." It is on this principle that depends the effect of those tubes which are now in such general use, as modes of communication between distant apartments, in houses and public offices. Hence, also, are performed many amusing tricks with statues or busts, situated in different parts of a room, answering questions, and speaking to one another; the figures being connected by tubes concealed under the walls or floor, or communicating with an apartment below, in which a speaker is stationed.

Velocity of sound.

In regard to the actual velocity with which the impulse of sound advances, it appears, from the most accurate experiments on the discharge of pieces of ordnance, and marking the interval between the flash and the report, at a distance carefully measured, that in ordinary circumstances this amounts to no less than 1130 feet each second, which is nearly equal to the velocity of a cannon ball the moment it issues from the piece. This last is very speedily retarded by the resistance of the air; but sound advances with undiminished velocity. Hence it will travel a mile in a little more than four seconds and a half, or 12¾ miles per minute. On this depends an easy method of determining in many cases our distance from objects, and which may often prove useful, particularly in military operations. We have only to observe, in seconds, the interval between the flash and report of the cannon or musket, and allow 4½ seconds to every mile, or 1130 feet to every second. Thus, in a house in Lothian Street, directly opposite to the castle of Edinburgh, we have frequently observed a sensible interval elapse, as the sound of the guns travelled across the intermediate valley, we think about 2″ or more; and the distance in a straight line is about 760 yards, or a little less than half a mile. In the same manner, by observing the interval between the flash of lightning and the thunder, we can tell the distance of the point where the electric discharge takes place.

It is remarkable also, that all kinds of sound, strong or weak, acute or grave, advance with the same velocity; and this arises from the circumstance already noticed, that all the oscillatory movements in the air, however minute or however extended, are performed each in the very same interval of time. This effect was distinctly proved in the experiments made by Biot in the cast-iron pipes already noticed, by playing different airs on the flute at one of the extremities of the tube. Now, it is well known that a musical air is adapted to a certain measure or time, which regulates very nicely the intervals between the successive notes; consequently, if any of these were propagated more rapidly or more slowly than others, by the time they reached the ear these would have been confounded with what preceded or followed them; and the air would have appeared quite altered, in place of which it was uniformly regular, and in its natural time; whence it clearly followed, that all sounds are propagated with equal velocity.

Cause of echoes.

The above view of the propagation of sound explains at once the remarkable phenomenon of the echo, which arises in every case from obstacles opposing the progress of sound. The agitation in the air, however, though interrupted by such obstacles, is not destroyed: each aërial particle which strikes against the opposing surface is reflected from it like an elastic ball which strikes against any wall or table. The sound is thus reflected at an angle equal to the angle of incidence; and it is when a number of these reflected impressions are thrown back to the point whence the original sound issues, by the configuration of the opposing obstacles, as so frequently happens among rocks, walls, &c. that an echo is produced.

Air not the only vehicle of sound.

Hitherto we have considered the *air* only as the vehicle of sound, and, without doubt, it is the grand medium of its transmission. Other bodies, however, convey it in a similar manner, and some of them even with much greater rapidity and force. In the liquid element this is proved by the acuteness which fishes display to sounds made in the air, and by many experiments. Professor Robison related, that with his head plunged under water, he could hear the sound of a bell, rung also in the water, at the distance of 1200 feet. We have already seen how the tremor of the piano-forte is communicated to the floor of the apartment; and many other familiar facts show clearly that sound is transmitted through the most solid bodies. How readily do we hear from one apartment of a house, or from one floor to another. The scratch of a pin is easily heard from one end of a log to another. A well-known but striking experiment in illustration of the transmission of sound is, to suspend any sonorous body, as a bell, a glass, a silver spoon, or a tuning fork, from a thread, and putting with the finger the extremities of the thread one in each ear;—if the body be then struck against any obstacle, the apparent loudness and depth of the sound are quite surprising. Again, if we shut the ears altogether, we yet feel very sensibly the impression of any sound conveyed through the mouth, the teeth, or the head:—if we put a small stick or rod in the mouth, and touch with the other extremity a watch lying on the table, the beats will become quite audible, though the ears be actually shut. Every noise in the mouth or among the teeth is conveyed internally to the ear in the same manner. Sound, therefore, is transmitted through liquids and solids, as well as through the air; and indeed, when we consider that the former are quite similarly constituted with the air, being composed of an infinite number of little particles, combined into a system by the same species of attractive and repulsive forces, it is noway surprising that an impulse communicated to any of these bodies should in like manner be diffused throughout the mass; and this must be by the same species of internal oscillations among the particles.

Such being the nature and propagation of sound, and its actual velocity as determined by experiment, it has long been the study of philosophers to reconcile these effects with those physical properties of the air and of liquid bodies, which are known from other circumstances, and can be calculated by the laws of mechanics, aided by the powers of mathematical analysis. This subject is investigated in the following Part; written, as already mentioned, by Professor Leslie. (c.)

Part II.

The doctrine of sound is unquestionably the most subtile and abstruse in the whole range of physical science. It has given occasion, in recent times, to much controversy and discussion, and has eventually called forth all the mighty resources of a refined and elaborate calculus. Yet an evident obscurity still remains to overcloud the subject. The discrepancies between theory and observation have been made entirely to disappear from astronomy, which has at last attained a degree of perfection befitting the sublimity of the science. But some latent suspicions pervade the structure of acoustics, sufficient to disturb that feeling of confidence which is calculated to invigorate our pursuits.

Sound conveyed by a certain tremor.

The impression of sound is conveyed by means of a certain tremor or internal agitation, which shoots, with more or less celerity and force, through any substance, whether solid or fluid. Nor is it requisite that the conducting medium should belong to the class of bodies which are commonly denominated elastic. In fact, all bodies whatever, in the minute and sudden alterations of their form, exert a perfect elasticity, and only seem to want this energy when they undergo such great changes that their component particles take a new *set* or arrangement, which prevents the full effect of re-action.

It is not every kind of tremulous motion, however, that will excite the sensation of sound. A certain degree of force and frequency in the pulsations appears always necessary to affect our sense of hearing. Yet the impression of sound is not confined to the mere external organ: the auditory nerves have a considerable expansion, and sympathize with those of taste and of smell. The only inlet of vision is by that very narrow aperture, the pupil of the eye; but the reception of sound partakes more of the character of the general sense of feeling, which, though most vivid at the extremities of the fingers, is likewise diffused over the whole surface of the body. The intimation of the ear is accordingly assisted by the consent of the palate, the teeth, and the nostrils. Fishes hear very acutely under water, though the organ itself lies so concealed in the head as to have long escaped the diligence of anatomists.

It was formerly supposed, that the transmission of impulse through a solid body is perfectly instantaneous. This formed, indeed, one of the Cartesian tenets, which Newton himself has tacitly admitted. But accurate observations have since proved, that motion is always really progressive, and propagated in succession. Professor Leslie has shown that the darting of impact through any substance, whether hard or soft, is accomplished by the agency of the same interior mechanism as that of sound, and has furnished the method of calculating, in some of the more difficult cases, the celerity of transmission.

All bodies essentially elastic.

All bodies may be considered as composed of physical points, without any sensible magnitude, but connected together by a system of mutual attraction and repulsion. When those integrant particles are compressed by external violence, a repulsive force is exerted to regain their first position; or if they be dilated, a corresponding attraction now draws them back to their neutral site of equilibrium. We may further presume, that in solids these constituent forces are confined to the proximate particles only, but that in the case of liquids or other fluids they embrace the particles in their near vicinity, and include a sphere of action varying in its extent. Hence, the former suffer disruption, without bending or giving way to powerful pressure; while the latter, acting by a sympathetic union, gently recede and take a new arrangement. In fact, the attribute of hardness applied to body is only a relative, and not an absolute quality; in the inferior degrees it relapses into softness, and softness again passes through interminable shades to the most yielding fluidity. The application of heat, by enlarging the system of internal connection, generally promotes softness, and heightens the degree of fluidity itself. The effect is conspicuous in the increased flow from a capillary syphon, when kept warm. But even liquids, when struck with a blow so rapid and sudden as to preclude the sympathy of their adjacent molecules, will assume all the character of the hardest substances. This fact has a familiar illustration in the play of duck and drake; but it is beautifully exemplified in the successive rebounds made by cannon-shot, from the surface of the sea.

In confirmation of the remark, we may quote a very singular and curious circumstance, mentioned by travellers, relative to the method of catching fish, which is successfully practised in some of the more northern countries. The hardy peasant, when the smaller lakes and rivers of Lapland or Siberia are completely frozen over, as soon as he observes, through the clear ice, a fish, perhaps at a considerable depth, but lying close to the bottom, strikes a smart blow against the firm surface, and the impulse sent through the vertical column of water instantly stuns or kills his prey, which he draws up by a large hook let down through the hole just made in the ice.

If we conceive a conducting substance to be struck at one extremity, the proximate particles, yielding at first to the impulsion, will again expand themselves, like the recoil of a spring, and press against the next particles in the chain. The vibratory commotion will thus be conveyed, by a successive transfer of impressions, along the whole series of physical points. Analogous also to the

Modulus of elasticity.

oscillations of a spring or a pendulum, this multitude of concatenated internal pulses, whatever be the force or extent of agitation, will constantly be performed in the same instants of time. The celerity of transmission must depend on the elasticity of the medium compared with its gravity. This estimate is most readily obtained by determining what may be called the *modulus* of elasticity, or the height of a column of the same density as the conducting substance, whose weight would measure that elasticity; or, to speak more precisely, that the thousandth part of such a column, for instance, should be equivalent to the repulsive force corresponding to a condensation of one thousandth part in the vibrating body. It may be demonstrated from the principles of dynamics, that the celerity of the transmission of impulse or sound through any medium is equal to what a falling body would acquire in falling through half the height of the modulus of elasticity. Hence this celerity for each second will be expressed in English feet by multiplying the square root of half the modulus by 8, or by extracting the square root of the modulus multiplied by 32.

Celerity of sound through different solid bodies.

Mr Leslie has pointed out a very simple method for ascertaining the modulus of elasticity in the case of solid rods or planks, by observing, when they are laid in a horizontal position, with their ends resting against two props, the *swag* or curvature which they take. By an experiment of this kind, he found that Memel fir had a modulus equal to 671,625 feet. Wherefore, an impulse would shoot through the substance of a deal-board with the velocity of 4,636 feet each second, or about four times the rapidity of sound. Professor Chladni, who has thrown so much curious light on the convoluted curves formed by vibrations spreading along the surface of solid bodies, inferred, from a very different procedure,—from the musical note which a bar of the substance emits when struck,—the celerity of the transmission of sound through iron and glass, which he reckoned for both at 17,500 feet, or above three miles each second, being more than fifteen times swifter than the ordinary communication through the atmosphere.

The rate with which the tremor of sound is transmitted through cast-iron, was very lately ascertained, from actual experiment, by the ingenious M. Biot. This philosopher availed himself of the opportunity of the laying of a system of iron pipes, to convey water to Paris. These pipes were about eight feet each in length, connected together by narrow leaden rings. A bell being suspended within the cavity, at one end of the train of pipes, on striking the clapper at the same instant against the side of the bell and against the internal surface of the pipe, two distinct sounds were successively heard by an observer stationed at the other extremity. In these observations M. Biot was often assisted by the late M. Malus, who has, too soon for the progress of science, been hurried away by death, after having opened the delicate discovery of the *polarization of light.* With a train of iron pipes of 2550 feet, or nearly half a mile in length, the interval between the two sounds was found, from a mean of two hundred trials, to be 2·79 seconds. But the transmission of sound through the internal column of air would have taken 2·5 seconds; which leaves ·29″ for the rapidity of the tremor conducted through the cast-iron. From other more direct trials, it was concluded that the exact interval of time during which the sound performed its passage through the substance of the train of pipes, amounted only to 26-100th parts of a second; being ten to twelve times less than the ordinary transmission through the atmosphere.

Except the observations of M. Hassenfratz, in the famous subterranean quarries which extend under almost the whole of Paris, we are not acquainted with any attempts that have been made to measure the elasticity of stone or brick. Yet sound is conveyed through these materials with great effect. The rattling of a carriage on the street spreads a very sensible tremor along the most solid buildings and the stateliest edifices. If a large stone be rubbed against the outside of the wall of a house, it will occasion within doors a strange rumbling noise. A miner will strike his pick against the side of a long gallery, when he wishes to give intimation to his companion, who listens at the other extremity. But stones or bricks, without being directly excited, may yet form a part of the chain which transmits sound, by receiving the tremulous impressions from the air on the one side, and delivering them again to that fluid on the other. We all know how easily the voice is heard through a thin partition. The mode of obstructing the passage of sound is, either to employ very thick masonry, or to interrupt the facility of communication and transfer, by means of subdivisions opposed. Hence another distinct use of lath and plaster. Experiments on the elasticity of stones and other articles of building are not only curious, but of real importance; for, in many cases, their efficient strength must depend on their fitness to resist incidental impressions. This consideration is peculiarly necessary in selecting and combining the materials employed in the construction of bridges.

Supposed incompressibility of water.

Respecting the elasticity of water and other liquids, our information is more satisfactory and complete. It was long held as an axiom, that the substance of water is absolutely incompressible. Yet the experiments on which this belief was grounded would, if weighed attentively, point to an opposite inference. On such a subject it were idle to cite Lord Bacon, whose credulity and ignorance of mathematical science betrayed him so often into false or shallow conclusions. The philosophers of the Florentine academy *del Cimento* tried the compression of water in three different ways, which are described in the account of their experiments printed in 1661. 1. Having provided two glass tubes terminated by hollow balls, they filled the one partly and the other to excess with pure water, and joined the tubes hermetically, so as to form one piece. Then applying heat to the first ball till the water boiled, they forced its vapour to press against the column in the other stem. But no contraction of the fluid took place, though a copper ball was afterwards substituted; and when the action of the heat was still farther urged, the tube at last burst with violence. 2. Into a glass tube, immediately above six pounds of water, they introduced eighty pounds of quicksilver, without causing any diminution of volume. 3. Their most noted experiment was, having filled a hollow silver ball with water by a small hole, afterwards soldered accurately, to give it a few smart blows with a hammer; when, far from suffering compression, the water was seen to ooze or spirt from the pores, as they imagined, of the silver.

Mr Boyle, whose practice it was generally to repeat the more striking experiments made on the Continent, had a round tin or pewter vessel filled carefully with water, and tightly plugged: the blow of a wooden mallet beat it flat, but on piercing the tin with the point of a small nail, the confined water instantly sprung to the height of two or three feet. About the year 1752, Dr Peter Shaw, who read public lectures in London, exhibited a stout copper ball of four inches in diameter, and filled with water by a small orifice, into which a screw was fitted, and forced to enter by turning an iron arm or lever: the globe was partly opened by this enormous squeeze, and the water spouted from the crevice as from a fountain.

These experiments all concur to show that water is capable of sustaining an immense pressure without undergoing any very sensible contraction; but they prove, at the same time, the actual existence of such a contraction, since the projecting of the water, after a crack has once begun in the vessel that confines it, could only proceed from the evolution of an internal repulsive force. Divers, accordingly, at considerable depths under water, hear distinctly the collision of two stones, or the remote ringing of a bell. Authentic instances are mentioned of sounds being transmitted audibly more than two miles through that fluid.

Compressibility of water demonstrated by Mr Canton.

The compressibility of water was first demonstrated by the ingenious Mr Canton in 1762, by a very simple and conclusive experiment. To a glass ball of rather more than an inch and half in diameter, he joined hermetically a tube about four inches long, and having a bore equal to the hundredth part of an inch. The relative capacity of this ball and of the stem he ascertained by introducing mercury, and weighing nicely its separate portions. The stem was then marked by the edge of a file into divisions, corresponding each to the hundred thousandth part of the whole capacity of the ball. This instrument was now filled with distilled water, carefully purged of its adhering air, and placed under the receiver of a pneumatic machine: on producing an exhaustion, the water appeared constantly to swell, rising four divisions and three-fifths in the stem, or a space nearly equal to the mercurial expansion corresponding to half a degree of heat on Fahrenheit's scale. In a condensing engine, the water sunk just as much, for each additional pressure of an atmosphere,—the bulb remaining always at the same temperature, or at the fiftieth degree of Fahrenheit. Since the stem was left open, the pressure exerted by the air, both on the inside and the outside of the instrument, must in all cases have been precisely the same; and consequently, the glass had no disposition to alter its figure, and modify the results. The contraction or expansion produced was, therefore, confined wholly to the body of water and to the thin shell of glass, of which indeed the influence might be rejected as insignificant. It was hence decided that the purest water suffers a visible concentration, or a diminution of its volume, under a powerful compression. But, in the course of his experiments, Mr Canton observed a curious circumstance, that water is more compressible in cold than in warm weather. Thus, the contraction, under a single incumbent atmosphere, amounted to 4·9 divisions when the thermometer stood at 34°, but was only 4·4 divisions when the heat rose to 64°. This singular fact might afford room for speculation; but it were better, in the mean while, to repeat the experiment again with more delicacy, and on a greater scale.

Compressibility of other fluids.

The compression of some other fluids was likewise measured in the same way. The contraction, under the weight of an atmosphere, and at the ordinary temperature, amounted, in millionth parts of the entire capacity of the ball, to sixty-six with alcohol, to forty-eight with olive oil, to forty with sea-water, and only to three when mercury was opposed. We may therefore estimate, in round numbers, the modulus of elasticity belonging to those different substances as under:

Alcohol	580,000 English feet.
Distilled water	700,000
Olive oil	730,000
Sea-water	780,000
Mercury	800,000

In liquids of so distinct a nature, we should have expected a greater diversity in their elastic power; nor is it easy to conceive on what conditions or habitudes that quality actually depends. The elasticity of a body, like its other constitutional properties, may result from the peculiar internal structure, or the arrangement of the integral molecules.

Some experiments on the compressibility of water have been since performed with more striking effect, but not equally exempt from all objections. In 1779, Professor Zimmerman of Brunswick printed a short account of some trials made by him and Abich, director of the salt-mines, with a press of a particular construction, consisting of a tight cylinder of very thick brass, with a piston nicely fitted, to be pushed down by means of a long lever, at whose extremity different weights were appended. Rain-water being introduced into the cavity, was subjected to an enormous pressure, equivalent to that of 313 atmospheres, and had its volume then diminished between one thirty-fifth and one thirty-sixth part. This quantity gives, for the effect of a single incumbent atmosphere, a condensation amounting to seventy-five millionth parts, instead of forty-six, as found by Mr Canton. The excess was no doubt owing to the distention of the brass cylinder, which, with all its strength and solidity, would yet partially yield to the action of such prodigious force. This circumstance renders the experiment somewhat unsatisfactory, and the influence of friction must likewise affect the accuracy of the calculation.

Zimmerman.

The effect of such distention is easily witnessed in the case of glass. If a large bulb of a thermometer be suddenly squeezed between the finger and the thumb, the mercury will start up in the stem perhaps several degrees, and will again sink as quickly after the pressure is removed. To prevent any derangement from communication of heat, the hand may be covered with a thick glove. But the fact can be shown in a less exceptionable way: Let a mercurial thermometer, with a large bulb and a long stem, be first held upright, and then immediately inverted; between these two positions the column of mercury will descend through a visible space. This apparent change of volume has been hastily supposed by some experimenters to mark the compressibility of mercury, which could not be sensible but under the action of a column of incomparably greater height.

It would be most desirable to institute a new set of observations on the condensation of different substances, by means of Bramah's hydraulic press, which is a far more perfect machine, and scarcely subject at all to the disturbance of friction. Having once ascertained the distention of the metallic cavity from pressure, it would be hence easy to correct all the other results. This mode of experimenting promises also the important advantage of enabling us to determine, with ease, the compressibility of solids themselves. It would only be required to give those bodies a cylindrical form nearly adapted to the cavity, and to fill up the interstice with water, or rather with mercury. The contraction which the thin sheet of fluid would undergo, being deducted from the whole contraction, would exhibit the contraction suffered by the solid nucleus.

Bramah's hydraulic press.

From all these investigations we may gather, that an impulse, or a sonorous tremor, would shoot through a body of fresh water with the velocity of about 4,475 feet each second, being four times swifter than the ordinary flight of sound in the atmosphere. Through the waters of the ocean, the transmission of sound would be still more rapid, by a seventeenth part. It hence follows, that a violent commotion, excited under that vast mass, might reach from pole to pole in the space of three hours and twenty minutes.

Celerity of sound through water.

The swell of the sea is accordingly always observed to precede the coming storm. The shocks of the famous earthquake at Lisbon, in 1755, were partially felt at very distant points of the ocean, as far even as the West Indies, but after a considerable interval of time.

and through ice.

Respecting the power of ice to conduct sound, we possess not sufficient data for the solution of the problem. The Danish philosophers are indeed said to have lately performed experiments of this kind on a very extensive scale, along the frozen surface of the Baltic. We are not acquainted with the precise results; but it seems probable, from various analogies, that ice has nearly the same faculty of transmission as water itself. If a heavy blow be struck against any part of the frozen surface of a large pool or lake, a person standing at a wide distance from the spot will feel, under foot, a very sensible tremor, some considerable time before the noise conveyed through the atmosphere has reached his ear. It is asserted, that the savage tribes who rove on the icy steppes of Tartary can readily distinguish, from afar, the approach of cavalry, by applying their head close to the frozen surface of the ground.

Propagation of sound through the atmosphere.

But the proper and ordinary vehicle of sound is our atmosphere. Aristotle, deriving his information probably from the tenets of the Pythagorean school, seems to have acquired tolerably just notions of the nature of sound and of the theory of harmonics. The language of that philosopher was so much corrupted, however, and disguised by ignorant transcribers, that Galileo, who not only studied music as a science, but practised it as a delightful art, may be fairly allowed to have rediscovered those general doctrines. Mersenne and Kircher afterwards made a variety of most ingenious experiments, which, though rather overlooked at the time, tended greatly to extend the science of harmony. But it was reserved for the genius of Newton to sketch out the true theory of sound.

Newton's theory of the propagation of sound.

In his *Principia* he explained the origin of aërial pulses, and, by a fine application of dynamics, conducted with his usual sagacity, he succeeded in calculating their celerity of transmission. The solution which he has given of this intricate problem is far, however, from being unexceptionable in the form and mode of reasoning. Instead of attempting to embrace all the conditions affecting the problem, in a differential equation, for which, indeed, his fluxionary calculus was not yet far enough advanced, he proceeds less boldly, and only arrives at the conclusion by an indirect process and a sort of compensation of errors. His investigation of the progress of sound through the air is chiefly drawn from the analogy of the motion of waves along the surface of water. This comparison greatly assists our conceptions, but it fails in a variety of essential points. Newton further assumed the rising and subsiding of waves to be a reciprocating motion, similar to that of the oscillations of a fluid contained in a wide and long tube, with its ends turned upwards. On this supposition, it was not difficult to prove, that those alternating movements would correspond to the vibrations of a pendulum of half the length of the tube. Transferring the inference, therefore, to the undulations of a fluid, it followed, that the space between two consecutive waves would be described during the sweep of a pendulum having a length equal to this interval. But the conclusion does not very well accord with the phenomena. That a wave travels with a velocity as the square root of its breadth, may be nearly true; and that its reciprocating motions, whatever be the height, are all performed in the same time, is a necessary consequence of the great principle in dynamics first pointed out by Huygens and Hooke,—that when the effort to restore equilibrium is proportioned to the quantity of displacement, the alternations of figure are constantly isochronous. But the velocity of the undulating progression, as calculated from those principles, will not be found to correspond with actual observation. Newton was apparently sensible of this disagreement, and would consider his proposition as only an approximation to the truth; assigning as the cause of discrepancy, *that the particles of water do not rise and fall perpendicularly, but rather describe arcs of a circle.* The great defect of the hypothesis, however, consisted in supposing all the parts of a wave to rise up and sink together in the same spot. The fact is, that the fore part of a wave is always in the act of ascending, while the hinder part of it is as constantly subsiding; which combined but contrary movements, without actually transferring any portion of the water, give an appearance of progressive advance to the swell.

In extending this theory to the propagation of sound, Newton was, on the whole, more successful. It resulted from his investigation, that the aërial pulses fly uniformly, spreading themselves equally on every side, and with a celerity equal to what would be acquired by a body in falling through half the height of the modulus of the air's elasticity.

His correction of the theory.

This modulus, or the altitude of a column of air, of uniform density, and whose pressure would be equivalent to the ordinary elasticity of that fluid, was computed in the first edition of the *Principia*, which came out in 1687, on the supposition that water is 850 times denser than air, mercury 13⅔ times denser than water, and that the mean height of the barometer is thirty English inches. The modulus of elasticity, or the height of an equiponderant column of air, was therefore estimated at 29,042 feet, which gave 968 feet each second for the celerity of the transmission of sound through the atmosphere. In the next edition, which did not appear till twenty-six years thereafter, the computation of the modulus was somewhat altered, but certainly not rendered more correct. Assuming the same standard of barometric height as before, and supposing mercury to be 13⅗ times heavier than water, and water 870 times heavier than air, the modulus would be 29,725 feet, to which the corresponding velocity of sound is 979 feet in the second.

In these successive estimates, there is perhaps betrayed some desire to magnify the result, yet without nearly approaching to the amount of actual observation. Dr Derham had recently determined, from repeated trials made with care, that the ordinary flight of sound is at the rate of 1142 feet each second; and Newton endeavoured, by some very strained hypotheses, to accommodate his calculation to this correct measure. 1. He supposes the particles of air to be perfectly solid spherules, whose diameter is the ninth part of their mutual distance. Sound, being instantaneously communicated through these, would thus have its velocity increased by one-ninth, or 109 feet, or brought up to 1088 feet in the second. 2. He next assumes, that the particles of vapour concealed in the air, and augmenting the common elasticity without partaking of the impression of sound, amount to a tenth part of the whole. This would increase the celerity of the sonorous pulse in the subduplicate ratio of 10 to 11, or as 20 to 21 nearly, and consequently advance the last measure from 1088 to 1142 feet.

Remarks on these corrections.

But these random and fanciful conjectures hardly require any serious consideration. What may be the size of the ultimate particles of air, or whether they have any sensible magnitude at all, we are utterly without the means of determining. There appears no limit, indeed, to the degree of condensation of which the air is capable, but what proceeds from the imperfection of the engines employed for that purpose. Nay, supposing so large a proportion of absolute matter to exist in the composition of our atmosphere, it really would not affect the result, since the transit of sound, as we have shown, is necessarily progressive, even through the most solid substance. To this principle there could be no exception, unless the particles of air were held to be mere atoms, incapable of further subdivision,—in short, without actual magnitude, and therefore bearing no relation whatever to the space in which they float. The second hypothesis advanced is still more insufficient to rectify the general conclusion. That moisture, in its latent or gaseous form, is united with the air, will be granted; but it by no means constitutes so notable a share of the fluid as Newton has assumed, scarcely exceeding, at the ordinary temperature, perhaps the five-hundredth part of the whole weight. But this diffuse vapour could not in the least derange the original calculation; for, being always combined with the air, the measure of elasticity assigned by experiment was really that of the compound fluid which forms our atmosphere.

Rectified calculation of the velocity of sound.

We are now enabled, by the help of more perfect data, to rectify the modulus of atmospheric elasticity, or the height of a homogeneous and equiponderant column of the fluid. From the observations made with barometrical measurements, it appears that such a column, exerting a pressure equivalent to the elasticity of the air, has, at the limit of freezing water, an altitude of 26,060 feet, and consequently, that the modulus would, at an ordinary temperature of 62° by Fahrenheit, amount to 27,800 feet. This corrected estimate gives only 943 feet each second for the celerity of sound. And since the elasticity of the medium is exactly proportioned to its density, the result is the same, whatever be the rarefaction or condensation of the air, so long as its temperature continues unaltered. The flight of sound is hence as rapid near the surface as in the higher regions of the atmosphere. It is the conjunction of heat alone that will increase the celerity of transmission, by augmenting the elasticity of the medium without adding to its weight. The acceleration thus produced must amount to rather more than one foot in the second for each degree by Fahrenheit's scale. Such a difference ought to be perceptible under the torrid zone.

Rate of transmission through different gases.

But the rate of the transmission of sound must vary in different gases, after the inverse subduplicate ratio of their densities. Thus, through carbonic gas, the communication of the tremor would be about one-third slower than ordinary; but through hydrogen gas, which is twelve times more elastic than common air, the flight would very nearly exceed three and a half times the usual rapidity. An admixture of this gas with the atmosphere would, therefore, greatly accelerate the transmission of sound. The joint combination of heat and moisture, by heightening the elasticity of the air, must likewise produce a similar effect.

Experiment in France,

These inferences are confirmed by observation, as far as it extends. The velocity of sound was determined with considerable accuracy, and on a great scale, by Cassini and Maraldi, while employed in conducting the trigonometrical survey of France. During the winter of the years 1738 and 1739, these astronomers repeatedly discharged, at night, when the air was calm and the temperature uniform, a small piece of ordnance, from their station on Mont Martre, above Paris, and measured the time that elapsed between the flash and the report, as observed from their signal tower at Montlehery, at the distance of about eighteen miles. The mean of numerous trials gave 1130 feet for the velocity of the transmission of sound.

and in America.

About the same time, Condamine, who was sent with the other academicians to ascertain the length of a degree in Peru, took an opportunity of likewise measuring the celerity of sound, at two very different points. He found this was 1175 feet on the sultry plain of Cayenne, and only 1120 feet on the frozen heights of Quito. It was obvious, therefore, that the rarefaction of the air in those lofty regions had in no degree affected the result. Compared with what had been observed in France, the velocity of the aërial pulses was somewhat diminished at Quito by the prevailing cold, but was, on the other hand, considerably augmented by the excessive heat and moisture which oppress Cayenne.

But the difference, amounting indeed to one-fifth of the whole, between the velocity of sound as deduced from theory, and as determined by actual experiment, still appeared very perplexing. This want of congruity was the more felt, since the Newtonian system of gravitation, after maintaining a long struggle with the adherents of the Cartesian philosophy, had at last obtained the undisputed possession of the Continent. Its triumph was insured by the admirable dissertations on the subject of tides, transmitted to the Academy of Sciences at Paris in the year 1740, when our celebrated countryman Maclaurin had the honour of sharing the prize with Euler and Daniel Bernoulli. The law of attraction received, indeed, a temporary shock a few years afterwards, from the result of the investigation which Clairaut first gave of the lunar inequalities; but, on resuming his analysis of the problem, and computing the values of the smaller terms of the formula, that great geometer obtained, in 1752, a final product, exactly conformable to the best astronomical observations; and the solidity of the Newtonian system was henceforth placed on the firmest foundation.

Investigation of Lagrange.

It was therefore peculiarly desirable to examine likewise the justness of the hydrodynamical conclusions of Newton. The propositions concerning the propagation of sound were perhaps justly considered as the most obscure part of the whole *Principia*. Some of the first-rate mathematicians abroad, particularly D'Alembert and John Bernoulli, declared their utter inability to comprehend such intricate and disjointed demonstrations. At last the problem of sonorous pulses was attacked directly, and in its full extent, by the late Count Lagrange, whose death, although at a ripe age, will be lamented as a most severe loss to mathematical science. That illustrious geometer shone forth at once like a meteor, and before he had completed his twenty-third year he gave a rigorous and profound analysis of the propagation of sound through the atmosphere, in the first volume of the Turin Memoirs, which appeared in 1759. "He pointed out some mistakes that even Newton had committed in the reasoning; but mistakes which, by a happy compensation of errors, did not affect essentially the results. Advancing from these discussions, he assigned the dynamical conditions of undulation, which, after the proper limitations, were reduced to an equation involving *partial differences* of the second order. But this refined branch of analysis, invented by D'Alembert and Euler, is still so imperfect, that, in order to integrate the final expression, it had become requisite to omit the higher powers of the differentials. Yet after all this display of accurate research and skilful adaptation of symbols, followed by a lax and incomplete calculus, the same conclusion was obtained as that which Newton had derived chiefly from the force of analogy and sagacity of observation; and philosophers were thus obliged to submit, and to content themselves with recording the variance between theory and experiment in regard to the celerity of sound, or with referring that discrepancy to some extraneous influence." (*Edinb. Review*, vol. xv. p. 431.)

M. Poisson, one of those interesting men whose native genius has surmounted all the obstacles of fortune, very lately attempted a more complete analysis of the propagation of sound, in the Papers of the Polytechnic School. The final equation is more fully expressed, and its integration is pushed some few steps farther; but still the result is precisely the same as before. The skill and precaution displayed in framing the conditions of the problem are afterwards mostly abandoned in the various simplifications adopted to arrive at the conclusion.

Rectification of the theory by Laplace.

A very ingenious and apparently satisfactory method of reconciling theory with observation, in the estimate of the transmission of sound, was not long since suggested by the celebrated Count Laplace. If the heat contained in air had, at every state of the density, been united constantly after the same proportion, the elasticity resulting from the infusion of this subtile and highly distensible element would invariably accord with what observation assigns to the compound aërial fluid. But the capacity of air, or its aptitude to retain heat, varies with its internal condition; being increased by rarefaction, and proportionally diminished by condensation. When air is compressed, therefore, it liberates a portion of its heat; and when it undergoes dilatation, it becomes disposed to abstract more heat from the adjoining bodies. Till the equilibrium of heat is restored, the air will be sensibly warmer after each act of compression, and colder when suffered to dilate. If the shock given to a portion of air be very sudden and violent, the quantity of heat evolved from it is profuse and powerful. On this principle, M. Mollet, member of the academy of Lyons, led by some facts noticed by artists who manufactured wind-guns, first constructed, in 1804, the curious instrument for producing fire by the rapid condensation of air confined in a tube. But such evolution of heat must besides augment the elasticity of the air, as the contrary abstraction of it will, in a like degree, diminish that force. At every sudden alteration of density, therefore, a new power is infused, which had not entered into the ordinary and undisturbed estimate of the air's elasticity. Consequently, from this consideration alone, the aërial pulses must shoot with some greater celerity than calculation assigns, because the particles of air, which are suddenly condensed, have their elasticity further augmented by the portion of heat evolved, while the corresponding particles, which are simultaneously dilated, have their disposition to contract likewise increased, by the momentary prevalence of cold.

Examination of this correction.

The principle advanced by Laplace must therefore have a real operation, tending to reconcile the calculated velocity of sound with that which is deduced from experiment. The only question is, how far its influence could actually extend. But, according to the formula given in Leslie's *Elements of Geometry*, p. 495, a condensation equal to the 90th part of the volume of air would occasion the extrication of one degree of heat by Fahrenheit's scale. Now, since each degree of heat enlarges the bulk or augments the elasticity of the air by the 450th part, it follows, that the heat, extricated by sudden impulse, will communicate to the air a momentary additional spring, amounting to one-fifth of the whole elastic force. Wherefore the celerity of sound would, by that influence, be increased in the subduplicate ratio of five to six, or nearly as 21 to 23; which gives an addition of only 90 feet each second to the whole quantity, bringing it up to 1033 feet. The correction is thus insufficient, not amounting to half of the discrepancy which it was its object to reconcile.

It may be suspected, therefore, that some inaccuracy or omission infects the investigation itself. Till the integral calculus has arrived at much greater perfection, it will often be requisite for the analyst, in the solution of dynamical problems, to descend from his elevation, and seek to simplify the differential expressions by a sober and judicious application of the principles of physics. "Imagine a string of particles, or physical points, A, B, C, D, E, F, &c. in a state of rest, or mutual balance. If A were pushed nearer to B, and then suddenly abandoned, it would recoil with a motion exactly similar to the oscillation of a pendulum. The time of this relapse might easily be determined, from a comparison of the force of gravity with that of elasticity, or from the number of particles contained in a column of equipoise. The minute interval between the adjacent particles, being now divided by the duration of each fit of contraction, will give the velocity with which the vibratory influence shoots along the chain of communication. This simple investigation leads still to the same result as before. But it proceeds on assumptions which are evidently incorrect; for it supposes the pulses to follow each other in accurate succession, every contraction terminating as the next begins. Since the particles, however, do not exist in a state of insulation, while B repels A, it must likewise press against C; and C, in its turn, must gradually affect D. Before the contraction of A and B is completed, that of B and C is therefore partially performed; and this anticipated influence may even extend to the remoter particles. Nor is the system of mutual action at all materially disturbed by such anticipations. Each pulsation is performed in the same way as if it were quite detached; only the succeeding one is partly accomplished before the regular period of its commencement. The velocity of aërial undulation is in this way much accelerated." (*Edinb. Rev.* vol. xv. p. 433.) Each successive movement among the particles may be viewed as produced by a force not regularly decreasing, but partaking of the uniformity which obtains in projection. Hence the velocity of sound is intermediate between that derived from theory and that with which air would rush into a vacuum. But the arithmetical mean between 943 and 1334 feet is 1138½, and the geometrical is 1121½ feet; neither of which differs much from 1130 feet, the quantity determined by actual experiment.

Modifications required in the theory of sound.

After the last correction, however, proposed by M. Laplace, for adjusting theory with observation relative to the celerity of the transmission of sound, the difference will not perhaps be regarded such as longer to present any serious obstacle; especially when the coincidence appears closer than what generally attends the theoretical deductions concerning the motions of fluids. The remaining difficulties affecting the subject refer chiefly to the way in which the aërial pulses are propagated, and the modifications which they are afterwards capable of receiving.

Duration and strength of pulsation.

1. No sensation is ever excited, unless the impression made upon our organs be repeated or continued during a certain short space of time. On this principle depends the whole success of the juggler, who contrives to change the situation of the various objects before us with a rapidity exceeding the ordinary exercise of sight or touch. A brand whirled swiftly round the head gives all the appearance of a circle of fire; and if one presses very hard an ivory ball between his fingers, he will seem still to feel it for several instants after it has been withdrawn. To excite the sensation of sound, it is requisite that the aërial pulses should have a certain force and duration. According to some observations, the ear is not affected at all, unless the tremulous impulse communicated to the tympanum lasts during the tenth part of a second. Every pulsation of a more transient kind is lost absolutely and completely to our organ of hearing.

On the other hand, the impression of sound is not prolonged beyond the time of its actual production. If it were otherwise, indeed, all sounds would degenerate into indistinct noises; and articulate discourse, which distinguishes man from the lower animals, and constitutes the charm of social life, would have been utterly impossible. This fact, so obvious, and yet so important, shows indisputably that the propagation of sonorous pulses through the atmosphere is not, in all its circumstances, analogous to the succession of waves on the surface of water. These undulations continue long afterwards to rise and spread from the centre of their production. The pulsations of the air, no doubt, likewise survive their excitement; but such of them as succeed the first impulsion must not have the force and character of those which are directly shot through the fluid. What is the precise discrimination between these different pulses, we are not enabled from mere theory to determine. But such a distinction must undoubtedly exist, otherwise indeed all discourse would continue to fill the ear with a monotonous hum, or an indistinct muttering. It would be difficult to institute conclusive experiments on this subject, yet collateral researches might be devised which could not fail to guide our inquiry.

Concentration in a particular direction.

2. But another defect in the analogy between waves and sonorous pulses is, that the latter, without affecting to spread equally, are capable of acquiring a superior force or tendency in some given direction. Certain unconfined sounds, indeed, are diffused uniformly on every side. Thus, the noise of the explosion of a powder-mill is heard, and often dreadfully felt, at a great distance all round the scene of disaster. But the report of a cannon, though audible in every direction, appears invariably loudest in the quarter to which the engine is pointed. On this principle, a seaman, when he seeks to be heard more audibly, or at a greater distance, is accustomed, if no other help occurs, to apply his spread hands on each side of his mouth, and thus check or diminish the waste of sound by its lateral dispersion. For the same reason, the bent and projecting circular piece annexed to the farther end of a speaking-trumpet is of most decided use, in assisting to give direction to the flight of the aërial pulses.

Accumulation along barriers.

3. The theory of undulatory movements furnishes some elucidation, but no adequate explication, of the augmented effect of sound in the direction of a lateral barrier. The extension of such an obstacle might appear to check merely the spread and consequent attenuation of the sonorous pulses; but the great accumulation of impulse always occurs, on either side, at the extremity of the advancing wave. By what system of interior forces this effect is produced, it would be difficult satisfactorily to explain. Yet we perceive something analogous in the swell which runs along the margin of a pool, and in the billow which, flowing from the open sea, heaves against the sides of a projecting mole.

It is hence that sound is made to sweep with such intensity over the smooth surface of a long wall or of an extended gallery. An elliptical figure, though of manifest advantage, is not really essential to a whispering gallery; for the point of sonorous concentration is found beyond the true catoptrical focus, and much nearer to the wall. A fact of the same kind is well ascertained—that sounds are always heard the most audibly, and at the greatest distance, in a level open country, or still better on the smooth surface of a vast lake, or of the ocean itself. The roaring of the cannon in certain naval engagements has been noticed at points so very remote from the scene of action, as might seem, if not perfectly authenticated, to be altogether incredible. On the other hand, again, sound is enfeebled and dissipated sooner in alpine regions. Thus, the traveller, roving at some height above a valley, descries, with uncommon clearness, perhaps a huntsman on the brow of the opposite mountain, and while he watches every flash, yet can he scarcely hear the report of the fowling-piece.

On a similar principle, we would explain the operation of the ear-trumpet, which affords such relief to one of the most cheerless maladies that can afflict humanity. The wide mouth of that instrument, it is well known, is turned to catch the stream of sound; the extent of pulsation is gradually contracted as the tide advances; and the same quantity of impulse being probably maintained, the vibratory energy is intensely accumulated at the narrow extremity, where it strikes the cavity of the ear. A trumpet of this form might, in many cases, be found very advantageous, not only for remedying the defects of the organ of hearing, but for assisting the observer to collect feeble and distant sounds. Even an umbrella held close behind the head, with its concavity fronting the sonorous pulses, will, it has been alleged, sensibly heighten their impression.

Reflection modified.

4. To explain legitimately the reflection of sound, would require some modifications in the theory of atmospheric undulation. Each obstructing point is certainly not the centre of a new system of pulses; for, in many cases, this would occasion unutterable confusion. Nor can the excitement of sound be supposed to dart in straight lines, or to perform the same accurate reflection as the rays of light. In fact, neither smoothness nor exact regularity of surface is required for the production of an echo. A range of buildings, a row of tall trees, a ridge of rocks, or a chain of heights, will, in certain positions, reflect sound with clear and audible effect. It follows, therefore, that the reflection must be formed, not at the immediate surface of those obstacles, which could occasion only an irregular dispersion, but at some boundary at a small distance, and running parallel to the mean direction of the whole barrier. We may conceive the tide of sound accumulating where it stops, and investing the opposite surface like an atmosphere, till a repulsion is exerted, which again rolls it back. What seems to constitute the perfection of an echo is, that the sum of the distances of every point of the reflecting surface from the person who speaks, and from him who listens, should be the same. When this disposition obtains, all the reflected sounds must reach the ear in due succession, without being intermingled or confused.

We may observe, that echoes are often confounded with the mere *resonance* occasioned by vibrations excited among the obstacles themselves. In a large empty room, with its naked floor, and walls, and benches, the voice quickly throws the whole into a tremulous commotion, and seems drowned in the ringing prolonged sound which is produced; nor does this unpleasant effect cease, until the spectators have occupied the benches, filled the hall, and obstructed by their weight the vibration of the floor. What is called the *deadening* of sound, consists in merely checking or preventing the disturbance of extraneous tremor. For this purpose, the floor is covered with carpets, and the walls lined with wainscot or hangings. Such barriers, we have seen, would not, by their yielding quality, blunt or obstruct the formation of echoes. Their only effect is, to muffle the elastic surfaces which they cover.

Speaking-trumpet.

The performance of the speaking-trumpet has generally been referred to the concentrated reflection of sound. Some authors have carried the hypothesis even so far as to investigate, from mathematical principles, the best figure of that instrument. Much labour and great ingenuity have been utterly wasted in this fruitless attempt.

Kircher proposed the tube to be shaped like a truncated parabolic conoid, the mouth-piece occupying the focus; and he concludes that all the *rays of sound* would, by reflection from such a surface, be sent forward exactly in parallel lines. Other philosophers have imagined, from a fanciful analogy to the property of ivory balls, that the figure described by the revolution of the logarithmic curve about its absciss would be the most proper for the speaking-trumpet. M. Lambert, of the Berlin academy, whose genius and originality were both of the first order, has given a solution still different. But it would be idle to recite the various attempts which have ended in no practical result.

The true physical explication of the speaking-trumpet was first given, as far as we know, in the course of an incidental remark by Professor Leslie, in his *Experimental Inquiry into the Nature and Propagation of Heat.* "In the case of articulate sounds," says he, "the confining of the air does not affect the pitch of voice, but it augments the degree of intonation. The lateral flow being checked, that fugacious medium receives a more condensed and vigorous impulsion. As the breath then escapes more slowly from the mouth, it waits and bears a fuller stroke from the organs of speech. But the speaking-trumpet is only an extension of the same principle. Its performance does certainly not depend upon any supposed repercussion of sound; repeated echoes might divide, but could not augment the quantity of impulse. In reality, however, neither the shape of the instrument, nor the kind of material of which it is made, seems to be of much consequence. Nor can we admit that the speaking-trumpet possesses any peculiar power of collecting sound in one direction; for it is distinctly audible on all sides, and is perhaps not much louder in front, comparatively, than the simple unassisted voice. The tube, by its length and narrowness, detains the efflux of air, and has the same effect as if it diminished the volubility of that fluid, or increased its density. The organs of articulation strike with concentrated force; and the pulses, so vigorously thus excited, are, from the reflected form of the aperture, finally enabled to escape, and to spread themselves along the atmosphere. To speak through a trumpet costs a very sensible effort, and soon fatigues and exhausts a person. This observation singularly confirms the justness of the theory which I have now brought forward."

Hassenfratz.

Nearly about the same time, this theory was confirmed by some ingenious experiments made by M. Hassenfratz, at Paris. His method of estimating the power of a speaking-trumpet consisted in fixing a small watch in the mouth-piece, and observing at what distance the beats ceased to be distinctly audible. He found that the effects were precisely the same with a trumpet of tinned iron, whether used in its naked form, or after it was tightly bound with linen to prevent any vibration of the metal. Nor could there be the smallest reflection of sound from the internal surface of the tube, for the beating of the watch was heard exactly at the same distance after the whole of the inside had been lined with woollen cloth. These simple experiments prove decisively that the performance of the speaking-trumpet depends principally on the intenser pulsation which is excited in the column of confined air. In the same way, sound is prodigiously augmented in a long narrow passage. If a musket be fired within the gallery of a mine, the explosion heard in a remote corner will have the loudness and character of thunder.

Sound of musketry.

Noise of thunder.

The progressive motion of sound furnishes the explication of various remarkable facts and striking phenomena. Thus, to a person standing at some distance, and directly in front of a long file of musketry, the general discharge will appear as a single collected sound, the numerous reports all reaching his ear nearly at the same instant. But one stationed at the end of the line will hear only a prolonged rolling noise, not unlike a running fire; because the distinct sounds, from the different distances which they have to travel, will arrive in a continued succession. Hence, likewise, the tremendous rumbling noise of distant thunder, which is not produced, as many have supposed, by the repetition of echoes. In certain situations, indeed, and particularly in hilly tracts, echoes may no doubt contribute to augment the general effect; but their ordinary influence seems to be really insignificant, since it should cause the same modification of sound in the explosion of a cannon, which is essentially different, however, from the muttering and crash of thunder. This lengthened and varied noise must yet be the production of a moment. The rapidity of lightning surpasses conception, and the prolongation of the sound which follows it is owing to the various distances of the chain of points which emit the sonorous impressions. The electrical influence darts with immeasurable swiftness from cloud to cloud, till perhaps it strikes at last into the ground. But from every point of this tortuous path distinct pulses of sound are transmitted, which consequently reach the ear at very different intervals. Sometimes they arrive intermingled, and give the sensation of a violent crash; at other times they seem suspended, and form a sort of pause. It would not be very difficult in any case to imagine the zig-zag track which the lightning must pursue in order to produce a given protracted rumbling noise. The duration of each peal of thunder will evidently be shortened if it chance to shoot athwart, but must continue the longest when it runs in the line of the spectator. As the distance of thunder is estimated by allowing somewhat more than a mile for every five seconds that elapse between the flash and the beginning of the report, so the space traversed by the lightning, if its general direction were known, might be computed by the same rule, from the endurance of the sound.

Musical note.

We will not enter at present on that branch of acoustics which treats of the doctrine of harmony; but a few scattered remarks may trace the general outline of the subject. A musical note, far from being only a repetition of the same simple sound, should be considered as the conjunction of subordinate sounds reiterated at proportional intervals. The sweetness of this compound effect or tone appears to depend on the frequent recurrence of interior unison. The secondary sounds which naturally and invariably accompany the fundamental note are repeated only two, three, or four times faster; nor does the science of music admit of any proportions but what arise from the limited combinations of those very simple numbers. Harmony, again, is created by an artificial union of different notes, analogous to the natural composition of tone.

Vibrating instruments.

All tones are produced by the regular vibrations either of solid substances or of confined air itself. Strings of gut or of metal are most generally used; but small plates or pillars of wood, of glass, or even of stone, will answer the same purpose, forming the singular instrument called *staccata* or *harmonica*. In these cases, the quality of the vibrations depends on the joint influence of a variety of circumstances; not only on the length of the fibres, but on their thickness, their elasticity, their density, and the degree of tension to which they are subjected. The motion of a musical stretched chord was first investigated by the very ingenious Dr Brook Taylor.

though his solution has been since proved to be incomplete. At the same time, in fact, that the whole chord oscillates, its simpler portions, the half, the third, and the fourth of its length, actually perform a set of intermediate vibrations.

Wind-instruments.

Wind-instruments produce their effect by the vibrations of a column of air confined at one end, and either open or shut at the other. These vibrations are determined merely by the length of the sounding column. Yet interior and subordinate vibrations are found to co-exist with the fundamental one. The whole column spontaneously divides itself into portions equal to the half, the third, or the fourth of its longitudinal extent. We shall more easily conceive these longitudinal vibrations, by observing the contractions and expansions of a long and very elastic string, to the end of which a ball is attached. A spiral spring shows still better the repeated stretching and recoil. If struck suddenly at the one end, it will exhibit not only a total vibration, but likewise partial ones, winding vermicularly along the chain of elastic rings.

But when the air is struck with uncommon force, the subordinate vibrations become predominant, and yield the clearest and loudest tones. This we perceive in the dying sounds of a bell, which rise by one or two octaves, and expire in the shrillest note. On such a very narrow foundation—on the variable force with which it is blown—rests the whole performance of the bugle-horn, whose compass is extremely small, consisting only of the simplest notes. In other wind-instruments, the several notes are caused by the different lengths of the tube, or by the various positions of the holes made in its side.

Tones produced by the burning of hydrogen gas.

The longitudinal vibrations of a column of air, contained within a tube open at both ends, are powerfully excited, and very loud and clear tones produced, by the inflammation of a streamlet of hydrogen gas. This curious experiment was made first in Germany, and appears indeed to have been scarcely known, or at least noticed in other countries. Yet it is most easily performed, and will be considered as amusing, if not instructive. A phial, having a long narrow glass pipe fitted to its neck, being partly filled with dilute sulphuric acid, a few bits of zinc are dropt into the liquid. As the decomposition of the water embodied with the acid now proceeds, the hydrogen gas thus generated flows regularly from the aperture, and is capable of catching fire, and of burning for some considerable time, with a small yet steady round flame. This very simple arrangement, frequently styled the philosophic lamp, is in reality of the same nature with the combination, on a large scale, of the gas lights. A glass tube being passed over the exit-pipe, the burning speck at its point instantly shoots into an elongated flame, and creates a continued sharp and brilliant musical sound. This effect is not owing to any vibrations of the tube itself, for it is nowise altered by tying a handkerchief tightly about the glass, or even by substituting a cylinder of paper. The tremor excited in the column of air is therefore the sole cause of the incessant tone, which only varies by a change in the place of the flame, or a partial obstruction applied at the end of the tube. But still it is not easy to conceive how the mere burning of a jet of hydrogen gas within the cavity should produce such powerful vibrations. The exciting force must necessarily act by starts, and not uniformly. The length of the flame might seem to prove, that the hydrogen gas is not consumed or converted into aqueous vapour as fast as it issues from the aperture. A jet of it catches instantaneous fire, but is immediately followed by another, the succession of inflamed portions being so rapid as entirely to escape the keenness of sight. The column of air contained within the tube would thus be agitated by a series of incessant strokes or sudden expansions.

The singular fact now described had occurred incidentally to the writer of this article in the course of his earliest experiments; and he has often thought since, that, on the same principle, an organ might be constructed, which would have a very curious and pleasing effect. A vertical motion of the glass tubes, and the partial shutting or opening of their upper ends, would occasion a considerable variety of notes. By passing the hydrogen gas over different metals, the flame would be made to assume various colours. The apparatus might work by a spontaneous mechanism; and while the eye was gratified by the display of rich and vivid tints, the ear would be charmed with strains of new and melodious symphony. (L.)

PART III.

Distinction between musical and other sounds.

We shall here add some further explanations in regard to the nature of different sounds, and particularly of musical sounds.

Nothing appears more surprising than that variety of sounds which different bodies emit when excited either by percussion or by any other method. If we strike, for example, upon a log of wood, or a table, or a book, we obtain nothing but a harsh sort of noise, which ceases almost the moment it is emitted. Whatever shape we form the wood into, it makes hardly any difference. The same thing takes place with other bodies, such as metal, or glass, or earthen ware, &c. when these are in large masses; but how different is the case if we form them into rods or slips, into thin plates, or, still better, into cylindrical or hemispherical vessels, as cups, tumblers, bells, cymbals, &c. These, when struck, invariably emit a sound much more prolonged, and in general highly musical or grateful to the ear. What, then, is the cause of this remarkable distinction? All that we can observe generally in regard to these sonorous bodies when sounding is, that the whole body is agitated by an internal tremor, which continues so long as the sound can be heard. But if we examine them in their simplest forms, some very remarkable circumstances are brought to light. Take, for example, a slip of metal or glass, fix it firmly at one extremity, and then strike the other; the body, as in other cases, emits a prolonged and musical note, and becomes agitated with the usual sonorous tremor. This is particularly well observed in a common tuning fork. But the nature of this agitation is of a very simple kind. The slip merely oscillates backwards and forwards with great rapidity on the extremity by which it is fixed. Each of these oscillations, as the slip strikes the surrounding air, must produce a distinct sound; but these impressions following each other in very rapid succession, the ear can distinguish nothing but a single continued and prolonged note. The same thing takes place if we fix the slip at both ends, provided it be long enough and thin enough to oscillate in the middle; and this is the case with all kinds of distended wires or strings. These are fixed at the two ends, and when they are struck, as with the hammer of the key of the piano-forte, or drawn aside by the hand and then abandoned, they continue to vibrate for a long time, and to emit tones varying in gravity or acuteness, but all highly musical. One remarkable circumstance regarding the vibrations of these slips or chords is, that they are all performed in the very same time, however minute or however extended. They vary in different slips or chords, according to their length, tension, and other circumstances; but in the same slip or chord they are all alike. When any chord or slip is drawn out of the straight line and then abandoned, the oscillations are wide at first, but continually diminish in extent till they cease altogether, as at Plate I. *Fig.* 1. Now the smallest of these vibrations takes just as long time in its performance as the largest; and the latter, again, however wide, is performed just as quickly as the former. The reason is, that the force of elasticity, which produces the vibrations, increases as the chord is drawn farther from the straight line, and thus accelerates the wide vibrations in proportion to their extent, as can easily be demonstrated. The consequence is, that the successive impressions of sound which constitute the continued and prolonged note, all follow each other at the same interval; and the regularity with which these impressions successively fall on the ear appears to be one essential ingredient in that melody or agreeable effect which the sound produces. This is proved by a very simple experiment. If we sound one of the strings of a violin or violoncello, it emits for a long time the musical note which belongs to it; but if, while it is sounding, we move the finger quickly along it from the bottom upwards, so as to shorten continually the length of the string, to accelerate thereby the vibrations, and thus alter the regularity of their succession, the sound continues, but all sort of melody is gone. Some philosophers, and in particular Dr Robison, have thought that this regular succession of sonorous impressions is the only source of melody; but this is far from being the case, else how could we account for those diversities in the sweetness of different tones, produced by different instruments or from different sources? What can be more regular in succession than the impressions of sound from a distant water-fall? And accordingly the effect is soft and agreeable in a high degree, yet how inferior in melody to the tone of a fine bell, or of an organ, or the notes of a distant bugle. Another remarkable circumstance regarding the vibrations of these slips or chords is, that the sound is not emitted from the string itself so much as from the mass with which it communicates. If, for example, we strike a tuning fork gently, so as to make it vibrate, it emits a sound so feeble that it cannot be heard until we bring it close up to the ear; but if, when it is vibrating, we press the extremity on a table, or a book, or any similar substance, the sound becomes perfectly audible. In the same manner a distended wire, if quite insulated, hardly emits an audible tone; but set it on a board, or, which is still better, on a hollow box, and then the tones are loud, deep, and highly musical. Many authors who have treated this subject ascribe the sound to the wire or chord striking the air at every vibration. This, however, is but an imperfect view of what really takes place. The tones arising from this source are in general perfectly inaudible, and the use of the wire is rather to excite the vibrations in the mass with which it is connected. This is the true sonorous body; and in this manner even wood, which appears when struck the most tuneless of all substances, is yet made to emit tones of the most exquisite sweetness; as appears in the violin and violoncello, harp, and indeed in all stringed instruments. The wood appears incapable of having a continued series of vibrations excited in it by percussion; but the strings produce this effect in a very remarkable manner, and which has hardly received that attention from writers on Acoustics which it deserves. They put the whole mass of the wood into a tremor, they excite its vibrations, and they determine and govern their frequency and the regularity of their succession. These vibrations over the whole surface of the wood communicate an infinite multitude of similar vibrations in the air, all which reaching the ear at the same instant, produce those powerful and audible tones which we observe.

Grave and acute sounds.

Let us now consider the nature of those remarkable distinctions of musical sounds into grave and acute, on the combination of which depends the whole charm of music. Every one knows, that in stringed instruments this depends entirely on the length and tension of the string, as is well observed in the violin. By shortening the strings with the fingers, we obtain notes always more and more acute; and by tightening the strings with the pins at their extremities, we produce the same effect. In different strings, also, another circumstance has a sensible effect, namely, the thickness or mass of the string: the greater this is, the sound is the more grave, and the less the more acute. All these effects are very clearly observed, and proved with mathematical accuracy, by means of an instrument termed the monochord or sonometer; which is an apparatus contrived for stretching different strings and causing them to sound by vibration, with props or bridges to vary their lengths, and weights suspended to vary and measure the different tensions, the vibrations of the strings being communicated to a hollow box of thin elastic wood, to augment the sound. *Fig.* 2. represents the instrument in an upright form, which is best adapted for experiment with tension, because the weight can be applied directly under the string without friction. *Fig.* 3. is a horizontal form: the weight here is applied over a pulley, and therefore the tension cannot be so very accurately measured. It answers, however, better for some other kinds of experiments, in regard to the length of the strings and the subordinate vibrations. Whichever of these forms of the instrument be used, we obtain invariably the same results. The more weight we apply to stretch any of the chords, the more acute does the sound become. If we lengthen the strings again in any degree, the more grave does the sound become; and the same takes place if we substitute a heavy for a light string. It is very remarkable, however, that if we examine these effects carefully, and apply the aid of mathematical investigation, they all resolve into one general law. Adding to the weight and tension on the strings, shortening their length and diminishing their weight, have all the same common effect; namely, to quicken their vibrations. It is on the single circumstance, therefore, of the quickness or slowness of the vibrations of the strings, in whatever way it is produced, that the acuteness or gravity of the tones depends. This, then, is the great law on which all the gradations of musical notes depend: quicken the vibrations of the chord by any means, and we are sure to sharpen the tone in the very same proportion: make the vibrations slower in any way, and in the same proportion does the tone become more grave. The above circumstances, however, do not all alter the rate of vibration in the same degree. If we shorten or lengthen the string, the vibrations are quickened or slackened, and consequently the tones made more acute or grave in the very same proportion; that is, a string half the length of another just makes double the number of vibrations in the same time, and one one-third of the length three times; one double the length, again, makes half the number of vibrations, and one triple the length one-third of the number. The effect of the tension, again, and the weight of the strings, follows a different law. If we load one string with double the weight of another, it does not double the number of vibrations: it requires four times the weight to do this, and nine times the weight to triple the number; the quickness being in all cases in proportion to the square root of the weight. The effect of the weight of the string follows a similar law; one string requiring four times the mass of another to make its vibrations in half the time, and nine times this to make them in one-third of the time. So that if we denote the length of the string by L, the weight of a lineal inch by W, and the weight or force of tension by T, then the number of vibrations, N, in a given time will be in proportion to $\frac{\sqrt{T}}{L\sqrt{W}}$.

On this law depends the construction of all kinds of stringed instruments, and the adjustment of the length, magnitude, and tension of the strings, to produce the tones that we wish in the instrument, without overstraining the materials, or making them any way liable to go out of tune. Accurate experiments, however, are wanting to apply with success the above formula to actual practice. On the above principle, also, of the velocity of the vibrations regulating the tone of every sound, depends entirely the system of our musical scale, as well as all those combinations of sound which constitute concord or harmony in music. Every one knows, that if with any sound we strike its octave at the same time, the two coalesce so completely together as to form almost a single continued note, which in music forms the most perfect concord. Now the octave above is emitted from that string whose vibrations are exactly double in number to the original note. The vibrations of the latter, therefore, must coincide completely with the former at every other vibration. The impression of both these reaches the ear at the very same instant, and thus the two sounds are blended into one. The intermediate sound of the octave which intervenes between these is hardly perceived, owing to the rapidity of their succession; and as it also recurs at regular intervals, it does not interrupt the harmony, but rather contributes to give fulness and richness to the combined tone. The same thing takes place, though in a less degree, with the double, the triple, and other octaves, and with all the different sounds which form concords together; and the more frequently the two sounds unite, the more perfect in every case is the concord. When they do not unite but at sensible intervals, there is then produced at each of these a distinct rise in the sound, which becomes suddenly louder from the union of the two, and then diminishes as they begin to separate, producing a succession of swells, or *beats*, as they are termed in music. The intervals between these beats are filled up by the vibrations of the two sounds occurring, first one and then the other; and as they form on the whole a very irregular succession of impressions, they produce a jarring effect, which grates on the ear. These combined sounds are hence termed *discords*. All this will be readily understood by an example or two, and a figure. Take first the fundamental tone and its octave; let the vibrations of each which produce the continued sound be represented by dots, as at *Fig.* 4; and when the two sounds concur, let this be denoted by dots larger in size: then the succession of impressions will be as at *Fig.* 5, where we have a regular succession of beats, recurring in such rapid succession that the ear can only distinguish a single sound. The octave also intervenes, but quite regularly, and also in such rapid succession, that it seems rather to heighten than to mar the general harmony. In the same manner, *Fig.* 6. represents the union of the fundamental sound and its double octave; which is the same system, only the beats are at wider intervals, and the intermediate octaves double in number. Take now two sounds, the number of whose vibrations are to each other as 2 to 3; that is, suppose one of them performs its vibrations in two very small parts of a second, and the other in three. If we take the annexed scale to represent the parts of a second, we easily form the series of sounds and of beats at *Fig.* 7. We have still, it will be seen, a regular succession of beats, but the intermediate single sounds do not recur at regular intervals. We have first an interval of two parts of a second; then we have three sounds succeeding each other during the other three parts; and then an interval of two parts between that and the beat. There is obviously, therefore, a tendency to discord; but the whole series occurs in such rapid succession that the effect on the ear is quite harmonious. Take now the proportion of 5 to 7. Here, as at *Fig.* 8, we have a regular succession of beats, but we have no fewer than ten intermediate single sounds, and these succeeding each other in a very irregular manner. We have all the elements of discord, therefore; and accordingly the union of these two sounds would be sure to grate on the ear, unless they were of so high a pitch that the beats should become inaudible. These would then produce, as before, a continued sound; and the effect of the intermediate ones would be in some degree, but not altogether, lost: we might have a concord, but not a very perfect one. It hence appears obvious why the union of some notes, which on a grave key are discordant, become harmonious by raising sufficiently the pitch. In the same manner, in every other case the greater the intervals between the successive conjunctions of the sounds, and the more irregular the succession of the intermediate impression, the greater will be the discord.

Such are the effects of combined sounds; but it is extremely remarkable that every single sound, besides its fundamental note, yields also spontaneously various others of the most perfect concord with it, but all higher, and each rising successively in pitch, so that they have hence received the name of *Acute Harmonics*. This curious and important fact, first noticed by Galileo, to whom also we are indebted for the theory of musical strings, has since excited much attention among succeeding philosophers, as well as among those skilled in the practice of music. In stringed instruments, it is best observed in the low notes of the piano-forte or violoncello. These were formerly thought to emit one simple uniform tone. An attentive ear, however, as is now universally allowed by musicians, can actually discover three others besides the original, viz. the octave above, the twelfth, and the double octave. This was first distinctly proved by Rameau; and the experiment is easily tried by striking one of the low keys, and withdrawing the finger briskly: then, after the fundamental note has ceased, the three shriller ones will be heard. The octave being in some measure blended with the original note, is not so easily perceived, except by an ear habituated to the minutest discrimination of sound. But with ordinary attention the twelfth and the double octave are heard distinctly.

Nothing in the whole science of Acoustics has given rise to so much speculation and varied discussion as this singular property of musical strings. It would appear at first sight to overturn the whole doctrine we have been laying down regarding the effect of the rapidity of the vibrations in regulating the tone; for here we have the same string yielding at once a diversity of notes, varying in a wide gradation from grave to acute. Can it be possible that the string, besides one principal series of vibrations from end to end, may at the same time execute vibrations among its parts, throwing itself, as in *Fig.* 9, into two, three, or four subdivisions; and the whole string, as it oscillates between its extremities, serving as a movable axis on which such partial vibrations may be at the same time performed? This appeared at first so extraordinary and wild a conjecture, that it was long ere it could meet with any serious attention among philosophers, far less be admitted as an accurate view of what really takes place. It was rather ascribed to something unconnected with the string; some referring the production of these harmonic notes to the structure of the ear, and the mode in which it receives the impression of the fundamental note; others, as the celebrated Lagrange, (to whom, along with our countryman Taylor, and Bernoulli, Euler, and D'Alembert, we owe the whole theory of the curves assumed by the vibration of musical strings,) supposed that they arose from sympathetic vibrations excited in the different bodies adjacent to the string, but without attempting to give any reason why these affections should always excite notes more acute than the fundamental. The possibility of these partial vibrations, however, was clearly proved by Daniel Bernoulli; and, however curious it may seem, the fact has now been established by many conclusive experiments and observations. That strings are capable of vibrating in this way, we may be convinced, from the following considerations. If we take any string, and withdraw it from the straight line by applying the finger, not to the centre, but nearer to one of the ends, so as to bring it into the position A B C, *Fig.* 10, then it will on the other side assume the position A D C, in every way the reverse of the first, as is easily proved by experiment. In general, the vibrations are so quick that they cannot be perceived by the eye; but if the finger be held opposite to B, or in any other part between A and C, it will be found that the vibration is nowhere so great as at D. In the same manner, if we apply both fingers in opposite directions, and at equal distances from the extremities, so as to draw the string into the position A B D C, the centre E remaining unchanged, then, on the other side, it will assume the position A *b* E *d* C; and as the central point E continues all the time immovable, it is evident that the whole string will continue vibrating partially, in the very same manner as if it had been composed of two strings, each half the length, and fixed at E. This point E is hence generally termed a node, or *nodal point*. In the same way, by applying the moving forces at other different points, the string may be made to perform three, four, or any greater number of partial vibrations, in relation to so many intermediate nodal points, *Fig.* 12; and it is not difficult to conceive, therefore, how, by the application of certain forces, the whole string may be performing its oscillations from end to end, while at the same time it may be agitated internally by two, three, or more partial vibrations; and this is proved by actual experiment. If we take a piece of common twine about fifteen or twenty feet long, and stretch it between two fixed points rather loosely;—if we then cause it to vibrate by the middle, it merely makes the ordinary vibrations; but if we apply our force to withdraw it from the straight line near one of the extremities, we can then see distinctly, besides its principal vibrations, a series of subordinate ones going on throughout its whole length. It is remarkable also that strings of this kind are extremely susceptible of these subordinate vibrations. When the string is vibrating regularly between its extremities, the slightest deranging circumstance is sufficient to excite and to superinduce the partial actions; as appears very distinctly in an experiment contrived by Mr Hawkins of London, by stretching between two bridges a long and spirally coiled brass wire, the spirals being about the diameter of a quill, and extended considerably more than those of a cork-screw. The tension was such as hardly to emit any sound, but to leave the vibrations when touched quite visible to the eye. If, when the whole string is vibrating, we oppose a slight obstacle, say at the middle, the string then instantly divides itself into two, and along with its principal vibration performs two others between the centre and each extremity. If the obstacle—and even a puff of wind from the mouth is sufficient—be placed at the distance of one-fourth the length of the string from either extremity, then it divides itself into four, and along with its principal vibration performs four others; and so on, according to whatever aliquot part of the string the obstacle be presented; the latter always subdividing itself into the same number of parts, and performing a series of subordinate vibrations between each, which can often be observed and heard for several minutes accompanying the principal one. The same effects are beautifully observed, as was first shown by Professor Robison, by means of a monochord sounded by an ivory wheel. When the string was vibrating simply, if its middle point was then touched slightly with a quill, this point instantly stopped, but the string continued to vibrate in two parts, sounding the octave; and the same thing happened if it was touched at one-third,—it then divided itself into three parts, with two nodal points, and sounded the twelfth; and any thing soft, such as a lock of cotton, put in the way of the wide vibrations of the string, was sufficient to produce the effect.

From these facts and observations, therefore, no doubt can remain that the acute harmonics accompanying the fundamental note arise entirely from these partial vibrations, of which every string appears to be so susceptible. But one important question still remains, and has never yet received any satisfactory solution; namely, what are the circumstances which determine these partial vibrations so generally in every string? Very slight obstacles are no doubt sufficient, but still there must be some particular causes to determine every string to divide itself so regularly into two, three, four, or more parts; executing in such regular succession the vibration peculiar to each. Inequalities in the densities or thicknesses of the different parts of the strings have been suggested as a probable reason; but this appears quite inadequate to produce effects so very constant in their operation, and which besides occur, let the string or wire be ever so uniform in its texture. This subject requires further examination, and the trial of several experiments. The only probable circumstance to which we can ascribe these effects consists in the re-action of the supports to which the extremities of the strings are attached. It is well known, that when two strings in the same instrument are tuned to the same note, if one of them be struck, the other begins to vibrate, and to sound at the same time. Strings differing by an octave have the same effect; and even those differing more in tone, yet appear to act and to re-act on each other. These effects have usually been ascribed to the action of the air, communicating the vibrations from one string to another. This, however, is not the case, as is proved by a simple experiment. If we stretch two similar strings on two different boards, and tune them to the same note; then if we detach the one wholly from the other, the vibrations of the one do not in the least affect those of the other, let them be even brought quite close together. But the moment we place the boards in contact with each other, though the strings themselves be thereby further separated than before, yet the one vibrates uniformly in sympathy with the other; and the moment the boards are again detached, the effect ceases. It is clear, therefore, that the vibrations of the one string are communicated to those of the other, not through the medium of the air, but through that of the wood; and this can only take place by means of the vibrations of the one string communicating through the supports to the wood. This agitates the supports of the other string, and these giving at first a very slight vibrating motion to the extremities, this gradually increases as it is continued, until the whole string is made to vibrate with the other. Instead of the effect, therefore, proceeding from the middle of the string to either extremity, as would be the case with aërial pulses, it is just the reverse. When once the motion is begun, the aërial undulations may certainly aid and augment the effect; but this, without doubt, originates at the extremities of the strings, and from these is communicated to the centre. That strings in unison with each other should vibrate in this manner more readily than any other, is quite easily accounted for; because in that case the vibrations of the one, however they may be produced, are quite isochronous with those of the other: they are more readily excited, therefore, because when they are once begun, however minute they may be at first, they yet harmonize exactly with the other, and every succeeding impulse from it just arrives in the proper time to augment the effect of the preceding, until the two motions become exactly alike. Were the string not isochronous, the succeeding impulses might tend sometimes to augment and sometimes to diminish the effect of the preceding ones; so that no sensible vibration would take place, as really happens with all discordant strings. With octaves, however, and other concords, the vibrations are still produced, because the vibrations of the fundamental note always concur with those at certain intervals, and at others do not oppose them. All these effects are very similar to what occurs in the motion of pendulums; a very slight impulse is sufficient to put a large pendulum into very wide vibrations, if it be often repeated, and always at the proper time to augment and not oppose the motion already communicated. Here it is that pendulums swinging in the same frame affect wonderfully the vibrations of each other, exactly like musical strings in the same instrument. If when two isochronous pendulums are at rest one of them be set in motion, in a short time the other commences to vibrate, in a very slight degree at first, but always increasing and increasing, until at last its oscillations become quite as wide as the other. This effect arises entirely from the vibrations of the one pendulum communicating through the wood very slight impulses to the axis or centre on which the other moves. This sets it in motion, and the impulses being constantly repeated and properly timed, excite at last vibrations as wide as the original. In a similar manner it is that one string causes another in the same instrument to vibrate, by means of the supports on which it is stretched; and if this be the case so remarkably in different strings, may not the vibrations of any single string re-act on itself through its own supports, and thus excite all those secondary vibrations which produce the acute harmonics? The string being first struck in the centre, the fundamental note must first of all be emitted. But the vibration of this agitating the supports at each extremity, these must necessarily re-act upon the string itself, must modify the original central impulse, and excite all those subordinate vibrations which are observed. That this is the true cause of these partial actions, and consequently of all those varied tones which they excite, appears extremely probable. But experiments, as we observed, are wanting to demonstrate these effects satisfactorily.

Such, then, are the singular phenomena of the acute harmonics, and of the subordinate vibrations of strings from whence they arise. Whatever be the cause of these, no doubt whatever can remain of the fact itself; and it is to this circumstance that we must perhaps ascribe much of that agreeable effect, so pleasing to the ear, which we experience in the tones of our musical instruments. Regularity of succession may determine a certain pitch in the sound; but it is from the harmonic tones mingling together, and blending with the gravity of the original note, that appears to arise all that sweetness and rich melody which so peculiarly belongs to them. Hence also we can now understand the reason of the musical effect arising from the sound of thin plates, cups, or bells: in all these, when they are examined minutely, we observe numerous vibrations among the parts; the substance of the plate dividing itself into various subdivisions, separated by nodal lines, between which all the parts are thrown into vibration. Hence arise a variety of harmonious notes; and these mingling together, produce that highly musical effect which we observe. It is to Professor Chladni that we owe a variety of curious facts regarding these vibrations of plates; which he observed by strewing them with fine sand: the nodal points and lines were then shown by the sand throwing itself from all the vibrating parts, and accumulating in little heaps along the lines which divide the vibrating surface, and where, therefore, there was no agitation at all. Squares of plate glass are well adapted for showing these effects. If we hold these by the centre in a sort of small wooden vice, as at *Fig.* 13, and then cause them to sound by drawing a bow along any of the edges, which are smoothed for the purpose with emery, the gravest tone is produced by applying the bow to one of the angles; and then the sand assumes the figure represented in *Fig.* 14. The tone next to this in graveness is produced by applying the bow to the middle of one of the sides; and then the sand assumes the figure represented in *Fig.* 15. By varying the points of application in this manner, and the figure of the plates, we obtain many other figures and curves for the nodal lines; such as *Fig.* 16, 17, 18, 19, &c. These effects are extremely curious and interesting: they are also very beautifully exhibited by plates of paper or other flexible membranes, stretched on frames like those of a drum or tambourine. But we must refer for further details on this subject to the *Traité d'Acoustique* of Chladni.

Besides the lateral vibrations above described, of strings, membranes, and plates, all these bodies are capable of vibrating longitudinally, and of emitting sounds which are in general much more acute than the others, and are regulated in their pitch by the length of the rods or strings. In this manner even the air itself, confined in a tube or pipe, is made to vibrate regularly, and to emit musical tones; and from this source arises another extensive and very important class of sounds, namely, those which are produced by the various kinds of wind-instruments, and of which also the tones of the human voice and of that of different animals present interesting examples. One is apt to imagine that the sound of a pipe or flute is emitted from the wood or other material of which it is composed; it really, however, arises from the cylinder of inclosed air, which is thrown into vibration by the current of air striking against the reed of the pipe, or against the sides of the hole in the plate. For a particular account of this class of sounds, see WIND-INSTRUMENTS, ORGAN, TRUMPET, &c.; and for a more particular account of the scale, and of musical harmony, see HARMONICS, MUSIC, TEMPERAMENT. (C.)

ACQS, a town at the foot of the Pyrenean mountains, in the department of Arriege and late province of Foix, in France. It takes its name from the hot waters in these parts.

ACQUAPENDENTE, a pretty large town of Italy, in the territory of the Church and patrimony of St Peter, with a bishop's see. It is seated on a mountain near the river Paglia, 10 miles west of Orvieto, and 57 north by west of Rome. It takes its name from a fall of water near it, and is now almost desolate.

ACQUARIA, a small town of Italy, in Frignana, a district of Modena, which is remarkable for its medicinal waters. It is 18 miles south-west of the city of Modena.

ACQUEST, or ACQUIST, in *Law*, signifies goods got by purchase or donation.

ACQUI, one of the provinces into which the continental dominions of the king of Sardinia are divided. It is bounded on the north-east by Alessandria, on the south-east and south by Genoa, on the south-west by Mondovi, on the west by Alba, and on the north-west by Asti. The extent is 534 square miles, or 341·760 acres. In the north the mountains decline to a fine undulating plain, watered by the rivers Bormido, Orbo, Erro, and Belbo, which in the adjoining province fall into the Tanaro, and then join the Po. The land is productive, and yields wheat, garden vegetables, wine, fruit, chesnuts, and much silk. Some cattle are bred and fattened; but the chief call for labour is in winding and throwing the silk. There are a few mines of iron and of some other minerals, but all inconsiderable. This province, which formerly was Upper Montserrat, contains two cities, 81 towns and villages, and nine hamlets, with a population amounting to 91,585 persons.

ACQUI, a town of Italy, in the duchy of Montferrat, with a bishop's see and commodious baths. It was taken by the Spaniards in 1745, and retaken by the Piedmontese in 1746; but after this it was taken again and dismantled by the French, who afterwards forsook it. It is seated on the river Bormia, 25 miles north-west of Genoa, and 30 south of Casal. Long. 8. 10. E. Lat. 44. 4. N.

ACQUISITION, in general, denotes the obtaining or procuring something. Among lawyers it is used for the right or title to an estate got by purchase or donation.

ACQUITTANCE, a release or discharge in writing for a sum of money, witnessing that the party has paid the said sum.

ACRA, a considerable country near the eastern extremity of the Gold Coast of Africa. It is fertile, healthy, and the inhabitants are of a more polished and civilized character than the majority of those found upon that coast. While the slave-trade was carried on with activity, there was a great resort of the European nations to Acra, and the factories established by them: Fort James by the English, Crevecœur by the Dutch, and Christiansborg by the Danes, were the centre of an extensive trade. Acra has now greatly declined; and it may be considered, along with the rest of the coast, as dependent upon Ashantee. Adams considers this country as the boundary of the gold trade on the one side, and the ivory trade on the other; and sharing to a certain degree in both, though not to the same extent with some other districts.

ACRA, in *Ancient Geography*, one of the hills of Jerusalem, on which stood the lower town, which was the old Jerusalem; to which was afterwards added Zion, or the city of David. It was probably called *Acra*, from the fortress which Antiochus built there in order to annoy the temple, and which Simon Maccabeus took and razed to the ground.

ACRA *Japygia*, in *Ancient Geography*, called *Salentia* by Ptolemy; now *Capo di Leuca*: a promontory in the kingdom of Naples, to the south-east of Otranto.

ACRAGAS, or AGRAGAS, in *Ancient Geography*, so called by the Greeks, and sometimes by the Romans, but more generally *Agrigentum* by the latter; a town on the south coast of Sicily. See AGRIGENTUM.

ACRAMAR. See VAN.

ACRASIA, among physicians, implies the predominancy of one quality above another, either with regard to artificial mixtures, or the humours of the human body. The word is Greek, and compounded of α privative, and κεραννυμι, to *mix*; *q. d.* not mixed in a just proportion.

ACRE, or ACRA, a town and seaport of Palestine, in the pachalic of Acre, and formerly a splendid city of antiquity, called *Ptolemais*, from Ptolemy, king of Egypt. It was named Acra from its fortifications; and by the knights of St John of Jerusalem it was called St John d'Acre. No town has experienced greater changes from political revolutions and the calamities of war. It has been successively possessed by Alexander's successors, who ruled in Egypt, by the Romans, the Saracens, the Christian crusaders, and finally by the Turks. According to some travellers, this city was the Accho of the Scriptures, one of the strongholds of which the Israelites could not dispossess the Cannanites; and in confirmation of this supposition, Mr Buckingham, who visited Acre in 1816, found in the ditches which they were then digging around the wall, fragments of houses which bore marks of the highest antiquity; consisting of that highly sun-burnt brick, with a mixture of cement and sand, which was only used in buildings constructed in the remotest ages. It is only, however, during its possession by Ptolemy, and when it was called Ptolemais, that history gives any certain account of it. It was known during those ancient times to be a great city; and although no perfect monument of its grandeur now remains, yet throughout the modern town are seen fine marble and granite pillars, used at the thresholds of door-ways, or in the other parts of ordinary buildings, or lying neglected on the ground. When the empire of the Romans began to extend over Asia, Ptolemais came into their possession; and it yielded in like manner to the growing power of the Saracens. They were expelled from it in 1192 by Richard I. of England and Philip of France, who purchased this conquest by the sacrifice of 100,000 troops. They gave the town to the knights of St John of Jerusalem, and it afterwards became the principal scene of contest between the Crusaders and the Saracens. In 1187 it was recovered from the Christians by Saladin, sultan of Egypt; and after a siege of three years was retaken by the Christians, in whose possession it remained during a whole century. It was at this time a large and extensive city, on the direct route to Jerusalem, and a place of great resort. It was accordingly populous and wealthy, and contained numerous churches, convents, and hospitals, of which no traces now remain. The city was under a peculiar system of government, being ruled by all the Christian powers both of Europe and Asia, 19 of whom exercised independent authority within its bounds. It was taken by the Saracens after a bloody siege in 1291, during which it suffered severely, and afterwards fell into decay. So late as the year 1696, Maundrell, who visited it, states that it had never recovered from its last overthrow; and that, with the exception of the residences of the French factors, a mosque, and a few poor cottages, it presented a vast and spacious scene of ruin. Since this period Acre has again become a considerable city; within the last 30 years it has been enlarged, and at the same time strengthened and improved. The last siege to which it was exposed was the celebrated one in 1799, when it was attacked by the French under Buonaparte; but was gallantly defended by the Turks, animated by the example and advice of Sir Sydney Smith. During the siege the French succeeded in making repeated breaches in the walls, through which they rushed to the assault with the most desperate bravery; but they were as often repulsed with dreadful carnage by the Turks and their gallant allies, and finally abandoned the attempt on the 20th of May, after they had continued the siege for 61 days.

The town is situated at the extremity of a plain on the edge of the sea-shore, and at the point of a bay formed by the promontory of Mount Carmel on the south-west, and the termination of the plain itself on the north-east. This bay faces the north-west, and from Cape Carmel to the city it may be about ten miles across. The bay affords no shelter in bad weather, being open to the north-west winds, which blow violently on the coast; and the port of Acre is a small hollow basin behind a ruined mole, scarcely capable of containing a dozen of boats. Vessels coming to this coast, therefore, either to load or discharge their cargoes, generally frequent the road of Caipha, a place of anchorage at the bottom of the bay, near which the river Kishon flows into the sea. The town, on the sides which face towards the sea, is inclosed by a single wall which on the north-west ranges along a sandy beach, and is unfortified; on the south-west side it is built on rocks washed by the sea, and is mounted with 40 pieces of cannon, chiefly brass. The north-east and south-east sides, which face towards the land, are surrounded by a double wall and ditch. The outer wall, which is but of very indifferent workmanship, is from 30 to 40 feet in height, provided with semicircular bastions at stated distances, and with embrasures for cannon; and it is further strengthened by a dry ditch, from 15 to 20 feet in depth, and 20 to 25 in breadth. The outer walls are the work of Djezzar Pacha, who, after the expulsion of the French from Syria, was at great pains to improve the fortifications of the place. On the outer and inner walls are planted from 100 to 120 pieces of cannon. The only gate of entrance into the city is on the south-east front near the sea, where is a Turkish cemetery and a small garden.

The town presents in the interior that incongruous appearance of gaudy splendour and extreme wretchedness which is so common in all the cities of the East. Among the chief buildings may be reckoned an extensive palace of Suliman Pacha, with spacious courts, fountains, &c. Opposite to this is a fine mosque, built also by him, the lofty dome and minaret of which are conspicuous from a distance, and another palace of Ali Pacha. These buildings have all a fountain near them in the public street, inclosed by a brass-work frame. They are highly ornamented, and executed in the style common at Constantinople. The other mosques, which are six in number, are built in the same fashion as that of Suliman Pacha; but they are of a smaller size, and are every one of them surmounted by the crescent. The other religious edifices are a Catholic convent, a Greek church, and a Maronite place of worship. The Jews have also a synagogue.

Of the bazaars, besides several ordinary ones, there are two long ranges covered in by an arched roof, and lighted from above. They are paved with flag-stones, have benches on each side, and afford shelter both from the sun and rain. The property deposited is secured by two large gates, which are closed at each end. They are well supplied with provisions, and at a moderate price.

The old khane, or caravansary, is one of the best that is anywhere to be seen. It consists in general of a large square court, with a fine marble fountain in the centre, a piazza of arcades going round the whole, and galleries above, containing rooms for strangers. These galleries are furnished with lattice-work balconies, or projecting windows, quite in the Arabian style. The whole edifice, from the peculiar style and furnishing of its ornaments and construction, may be considered as most interesting, and the only perfect memorial of Saracen architecture still remaining in the place. Besides the inn allotted to the Franks, there are several others throughout the town occupied by Christians of different sects, all resembling caravansaries in their arrangement. There are also many spacious and well-built magazines, particularly one constructed by the pacha, having a paved court in the centre, surrounded by a piazza of arcades, consisting of about 40 granite pillars, taken from the ruins of the ancient city. The private dwellings are all of stone, differing in size and plan. The roofs are invariably flat, and provided with terraces for taking the air in the evenings of summer. The streets are in general narrow and dirty; only one or two are of any tolerable breadth. Many of them are paved. Near the north-western extremity of the town is a large space covered with ruined buildings, heaps of rubbish, and an accumulation of rain water. The population of Acre consists, one-half of Mahometans, in equal portions of Arabs and Turks; one-fourth of Christians of different persuasions; and one-fourth of Jews. Acre retains scarcely any memorials of its ancient state. The Saracenic remains are only partially to be traced in the inner walls of the town, which have been so often broken down and repaired as to preserve few traces of the original work. All the mosques, fountains, bazaars, and other buildings, with the exception of the caravansary already mentioned, are in a style rather Turkish than Arabic. The Christian ruins are altogether gone. There is not the slightest trace of any of the magnificent churches and convents described by Maundrell. Even the three Gothic arches mentioned by Dr Clarke, and called by the English sailors King Richard's Palace, have been razed to the ground. It is not easy to ascertain the causes which have swept away so many traces of the ancient city between Maundrell's visit in 1696, and Dr Clarke's in 1801; but the subsequent destruction was occasioned by Djezzar Pacha, when he was improving the fortifications of the town. The trade of Acre consists in the export of cotton, and in the importation of manufactures for the consumption of the surrounding country. It is 28 miles north-north-west of Jerusalem, and 27 south of Tyre. Long. 39. 25. E. Lat. 32. 40. N.

Acre, in Hindostan, the same with lack, signifies the sum of 100,000 rupees; the rupee is of the value of the French crown of three livres, or 30 sols of Holland; 100 lacks of rupees make a couron in Hindostan, or 10,000,000 rupees: the pound sterling is about eight rupees, according to which proportion a lack of rupees amounts to L.12,500 sterling.

Acre, a measure of superficies, and the principal denomination of land-measure in use throughout the whole of Great Britain. The word (formed from the Saxon *acher*, or the German *aker*, a field) did not originally signify a determinate quantity of land, but any open ground, especially a wide campaign; and in this antique sense it seems to be preserved in the names of places, as Castle-acre, West-acre, &c. The English standard acre, now the imperial acre of Britain, is a square raised from the basis of the chain of 66 feet, or 22 yards, or 1-80th of a mile. Ten of these squares form the acre, which thus contains 4840 square yards. This is divided into *roods*, of which there are four in the acre; and into *poles* or *perches*, of which there are 40 in each rood, or 160 in the acre. The rood will thus measure 1210 square yards, and the pole 30¼ square yards, according to the following table, which contains also other denominations useful to be compared with the acre.

Inches.	Links.						
62·726	1	Feet.					
144	2·295	1	Yards.	Poles or Perch.			
1296	20·661	9	1				
39204	625	272¼	30¼	1	Chains.		
627264	10000	4356	484	16	1	Roods.	
1568160	25000	10890	1210	40	2½	1	Acre
6272640	100000	43560	4840	160	10	4	1

The above is the standard acre of England; but various customary acres are in use throughout the different counties, deviating considerably from this standard both in excess and defect, though all of them are now illegal since the act 5 George IV., which establishes the same standard throughout the whole kingdom. In *Bedfordshire,* it is sometimes only two roods; *Cheshire,* formerly, and still in some places, 10,240 square yards; *Cornwall,* sometimes 5760 yards; *Dorsetshire,* generally 134 perches; *Hampshire,* from 107 to 120 perches, but sometimes 180; *Herefordshire,* two-thirds of a statute acre. The acre for *hops* contains 1000 plants, and is only equal to half a statute acre; for *wood,* again, it is 256 perches. *Leicestershire,* 2808¾ square yards; *Lincolnshire,* five roods, particularly for copyhold land; *Staffordshire,* nearly 2¼ acres; *Sussex,* 107, 110, 120, 130, or 212 perches; the *short* acre 100 or 120 perches, the *forest* acre 180 perches. *Westmoreland,* 6760 square yards, or 160 perches of 6½ yards square; in some parts the Irish acre is used: *Worcester,* the *hop* acre, of 1000 stocks, 90 perches, sometimes 132 or 141 perches.

In North Wales, the *Erw* or true acre is 4320 square yards, the *Stang* or customary acre 3240 square yards, as in Anglesea and Caernarvonshire, making 5½ Llathen, =160 perches of 4½ yards square, called *paladr:* 8 acres make an *ox-land,* and 8 of these a *plough-land,* in *Pembrokeshire.* In South Wales the Erw varies greatly with the perch; sometimes this is nine feet square, 160 perches making one stangell, and four stangells one erw of 5760 yards; sometimes 10½ feet square, making a quart or quarter of a llath, 40 of which make a stangell, and four stangells an erw, which is thus 7840 yards, equal to the Irish acre; sometimes 11 feet, called bat or eglwys haw, making the erw 9384 yards, as in *Glamorganshire,* one-fifth more = 11,261 yards; sometimes 11½ feet, called a llath, 48 making a quarter cyvar, and four cyvars an erw of 11,776 yards; lastly, 12 feet, giving an erw of 10,240 yards, equal to the Staffordshire acre.

Nothing can show more clearly than the existence of such numerous and useless diversities, the necessity of the late act for establishing a uniform standard throughout Great Britain, and which only requires to be enforced with strictness to abolish for ever every other measure. In Scotland the acre is much more uniform, scarcely deviating in any part more than one per cent. from the standard. It is raised from the chain of 24 ells; and by the verdict of the jury assembled at Edinburgh on the 4th February 1826, to determine the proportion between the existing measures and the imperial, the ell was found, according to an accurate measurement made by Mr Jardine, civil engineer, 37·0598 inches, making the chain 74·1196 feet, and the acre 6104 square yards and ·12789, &c. decimals of a yard. It is considerably larger, therefore, than the imperial acre; and as the act of uniformity establishes this latter in its stead, it makes an important change throughout Scotland, and it becomes necessary to know exactly the proportions between them. The imperial, we have seen, contains 4840 square yards, while the Scotish contains 6104·12789, &c. They are to each other, therefore, as 1 is to 1·26118345; so that 1000 acres Scotish are equal to 1261·18345 imperial; and in every case, to convert Scotish into imperial, multiply by the fraction 1·26118345: such minuteness, however, is seldom required in practice. A ready and very accurate approximation will be obtained by reckoning one acre Scotish equal to five quarters imperial, and $\frac{1}{90}$th part more. This will give the value of the acre almost to one-fourth of a square yard in defect. Hence we have this general rule: *To convert Scotish acres into imperial, add one-fourth; and if that is not sufficiently minute, add $\frac{1}{90}$th more.* Take, for example, 1000 acres, add one-fourth or 250, and we have 1250; add still $\frac{1}{90}$th, or 11, and we have 1261. This rule is obtained by expressing the above fraction in a series of which we take only the first three terms. It is one acre Scotish $= 1 + \frac{1}{4} + \frac{1}{90} + \frac{1}{14000}$, &c. acres imperial. By a similar rule, it is easy to convert the Scotish *money rates or prices* of land into imperial: we have only to multiply the Scotish prices by the fraction 0·792906, the reciprocal of the other; or *deduct one-fifth from the price, and for greater accuracy $\frac{1}{140}$th more; or what is still simpler, deduct 20¾ per cent. or 4s. 1¾d. in the pound from the Scotish prices.* An estate of 1000 acres, for example, is to be let at 30s. per acre: What is the rent per imperial acre? Deduct 4s. 1¾d. and the half of it for the additional 10s., and we have 6s. 2½d. less, or on the whole 23s. 9½d. These rules will apply in every practical case; and for very particular and extremely accurate purposes, recourse must be had to the original fractions 0·792906 and 1·26118345.

Such are the relations of the Scotish standard acre to the imperial; but until of late years, it was the practice of land-surveyors to measure with a chain of 74 feet and 4-10ths of a foot in length, the length of the ell having been erroneously estimated at 37 inches and 2-10ths of an inch. This practice increased the acre from 6104·13448 to 6150·4 square yards; it made the ratio of this acre to the imperial as 1 to 1·27074, &c.; or we may reckon one acre equal to five quarters imperial, and $\frac{1}{50}$th more.

When this error in the length of the chain came to be discovered, surveyors took to the chain of exactly 74 feet; this length being recommended by the round number, and the nearer approach to the standard. By it the acre contains only 6084·4444, &c. yards; it is to the imperial acre as 1 to 1·25711662, &c. or we make one of these acres equal to five quarters imperial, and $\frac{1}{130}$th more.

In Ireland the perch, of which the acre contains as usual 160, is a square of seven yards. The acre, therefore, contains 7840 square yards. See WEIGHTS AND MEASURES; *Parliamentary Reports of the Commissioners of Weights and Measures; Act 5 Geo. IV.;* and Buchanan's *Tables of Weights and Measures,* where the conversions are all given by inspection. (C.)

ACRE-Fight, an old sort of duel fought by English and Scotish combatants, between the frontiers of their kingdoms, with sword and lance: it was also called *camp-fight,* and the combatants *champions,* from the open field being the stage of trial.

ACRIBEIA, a term purely Greek, literally denoting an exquisite or delicate accuracy; sometimes used in our language, for want of a word of equal signification.

ACRIDOPHAGI, in *Ancient Geography,* an Ethiopian people, represented as inhabiting near the deserts, and to have fed on locusts. This latter circumstance their name imports, the word being compounded of the Greek *ακρις,* *locust*, and *φαγω*, *to eat*. Dr Sparrman informs us,[1] that "Locusts sometimes afford a high treat to the more unpolished and remote hordes of the Hottentots; when, as sometimes happens, after an interval of 8, 10, 15, or 20 years, they make their appearance in incredible numbers." The Abbé Poiret, also, in his *Memoir on the Insects of Barbary and Numidia*, informs us, that the Moors make locusts a part of their food, that they go to hunt them, fry them in oil and butter, and sell them publicly at Tunis, at Bonne, &c. From these accounts, we may see the folly of that dispute among the divines about the nature of St John's food in the wilderness; some maintaining the original word to signify the fruits of certain trees; others, a kind of birds, &c.: but those who adhered to the literal meaning of the text were at least the most orthodox, although their arguments were perhaps not so strong as they might have been had they had an opportunity of quoting such authors as the above.

ACRISIUS, in fabulous history, king of Argos, being told by the oracle that he should be killed by his grandchild, shut up his only daughter Danäe in a brazen tower; but Jupiter coming down in a golden shower, begot Perseus by her. After Perseus had slain the Gorgons, he carried Medusa's head to Argos; which Acrisius seeing, was turned into a statue.

ACRITAS, in *Ancient Geography*, a promontory of Messenia, running into the sea, and forming the beginning of the bay of Messene; now *Capo de Gallo*.

ACROAMATIC, or ACROATIC, in general denotes a thing sublime, profound, or abstruse.

ACROAMATICI, a denomination given to the disciples or followers of Aristotle, &c. who were admitted into the secrets of the inner or acroamatic philosophy.

ACROATIC is a name given to Aristotle's lectures to his disciples, which were of two kinds, *exoteric* and *acroatic*. The acroatic were those to which only his own disciples and intimate friends were admitted; whereas the exoteric were public and open to all. But there are other differences. The acroatic were set apart for the higher and more abstruse subjects; the exoteric were employed in rhetorical and civil speculations. Again, the acroatics were more subtile and exact, evidence and demonstration being here aimed at; the exoterics chiefly aimed at the probable and plausible. The former were the subject of the morning exercises in the Lyceum, the latter of the evening. Besides, the exoterics were published, whereas the acroatics were kept secret, being either entirely concealed, or, if they were published, it was in such obscure terms that few but his own disciples could be the wiser for them. Hence, when Alexander complained of his preceptor for publishing his acroatics, and thus revealing what should have been reserved to his disciples, Aristotle answered, that they were made public and not public; for that none who had not heard them explained by the author *viva voce* could understand them.

ACROBATES, in antiquity, were rope-dancers, who performed various feats by vaulting or tumbling on a rope; sliding down on a rope from a lofty station with arms and legs extended, in imitation of flying; and running, dancing, and leaping, on a rope stretched horizontally.

ACROBATICA, or ACROBATICUM, from *ακρος*, *high*, and *βατεω* or *βαινω*, *I go*; an ancient engine whereby people were raised aloft, that they might see more conveniently about them. The *acrobatica* among the Greeks amounted to the same with what they call *scansorium* among the Latins. Authors are divided as to the use of this engine. Turnebus and Barbarus take it to have been of the military kind, raised by besiegers, high enough to overlook the walls and discover the state of things on the other side. Baldus rather supposes it a kind of movable scaffold, or cradle, contrived for raising painters, plasterers, and other workmen, to the tops of houses, trees, &c. Some suspect that it might have been used for both purposes; which is the opinion of Vitruvius and Aquinas.

ACROCERAUNIA, or MONTES CERAUNII, in *Ancient Geography*, mountains so called from their being often struck by thunder. They are on the western coast of Greece, and terminate at a cape in Lat. 40. 25. N.

ACROCHERISMUS, among the Greeks, a sort of gymnastic exercise, in which the two combatants contended with their hands and fingers only, without closing or engaging the other parts of the body.

ACROCORINTHUS, in *Ancient Geography*, a high and steep hill hanging over the city of Corinth, on which was built the acropolis, or citadel.

ACROMION, in *Anatomy*, the upper part of the scapula or shoulder-blade.

ACROMONOGRAMMATICUM, in *Poetry*, a kind of poem, wherein every subsequent verse begins with the letter wherewith the immediately preceding one terminated.

ACRON, a celebrated physician of Agrigentum, in Sicily, who lived about the middle of the fifth century before Christ. He first thought of lighting large fires, and purifying the air with perfumes, to put a stop to the pestilence that ravaged Athens, and which was attended with success. He wrote two treatises, according to Suidas, in the Doric dialect; the one on physic, and the other on abstinence or diet.

ACRON, a considerable kingdom on the Gold Coast of Africa, the principal seaport of which is Apam, where the Dutch have a fort; but both it and the town were nearly destroyed during the Ashantee campaign of 1811, and the trade carried on there is now of little importance.

ACRONICAL, ACHRONYCAL, or ACHRONICAL, in *Astronomy*, is a term applied to the rising of a star when the sun is set in the evening; but has been promiscuously used to express a star's rising at sunset, or setting at sunrise.

ACROPOLIS, in *Ancient Geography*, the citadel and one of the divisions of Athens, called *Polis* because constituting the first and original city, and the *Upper* Polis to distinguish it from the lower, which was afterwards built round it in a large open plain, the Acropolis standing on a rock or eminence in the heart of this plain; and hence its name. To the north it had a wall built by the Pelasgi, and therefore called *Pelasgic*; and to the south a wall, by Cimon the son of Miltiades, out of the Persian spoils, many ages after the building of the north wall. It had nine gates, and was therefore called *Enneapylon*; yet but one principal gate or entrance, the ascent to which was by a flight of steps of white marble, built in a magnificent manner by Pericles.

ACROPOLITA, GEORGE, one of the writers in the Byzantine history, was born at Constantinople in the year 1220, and educated at the court of the Emperor John Ducas at Nice. He was employed in the most important affairs of the empire, being sent ambassador to Larissa to establish a peace with Michael of Epirus; and was constituted judge to try Michael Comnenus, who was suspected of engaging in a conspiracy. Theodorus Lascaris, the son of John, whom he had taught logic, appointed him governor of all the western provinces in his empire. In 1255, he was taken prisoner in a war with Michael Angelus; but gaining his liberty in 1260, by means of the Emperor Palæologus, he was sent by him ambassador to Constantine, prince of Bulgaria; and was employed in several other negotiations. He wrote, a Continuation of the Greek History, from the taking of Constantinople by the Latins till it was recovered by Michael Palæologus in 1261, which makes part of the Byzantine history; A Treatise concerning Faith, Virtue, and the Soul; An Exposition of the Sermons of St Gregory Nazianzen, and other pieces. Gregory Cyprian, patriarch of Constantinople, in an extravagant encomium upon him, prefixed to Acropolita's history, says he was equal to Aristotle in philosophy, and to Plato in the knowledge of divine things and Attic eloquence.

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[1] *Voyage to the Cape*, vol. i. p. 36.

ACROSPIRE, a vulgar term for what botanists call the *plumes*.

ACROSPIRED, in malt-making, is the grain's shooting both at the root and blade end.

ACROSTIC, in *Poetry*, a kind of poetical composition, disposed in such a manner that the initial letters of the verses form the name of some person, kingdom, place, motto, &c. The word is compounded of the Greek *ακρος*, *extremity*, and *στιχος*, *verse*. The acrostic is considered by the critics as a species of false wit, and is therefore very little regarded by the moderns.

ACROSTICHUM, Rustyback, Wall-rue, or Fork-Fern.

ACROSTOLIUM, in ancient naval architecture, the extreme part of the ornament used on the prows of ships, which was sometimes in the shape of a buckler, helmet, animal, &c. but more frequently circular, or spiral. It was usual to tear them from the prows of vanquished vessels, and fix them to those of the conquerors, as a signal of victory. They were frequently represented on the reverse of ancient medals.

ACROTELEUTIC, among ecclesiastic writers, an appellation given to any thing added to the end of a psalm; as the Gloria Patri, or Doxology.

ACROTERIA, in *Architecture*, small pedestals, usually without bases, anciently placed at the middle or two extremes of pediments or frontispieces, serving to support the statues, &c. It also signifies the figures placed as ornaments on the tops of churches, and the sharp pinnacles that stand in ranges about flat buildings with rails and balusters.—Among ancient physicians, it signified the larger extremities of the body, as the head, hands, and feet. It has also been used for the tips of the fingers, and sometimes for the eminence or processes of bones.

ACROTHYMION, from *ακρος*, *extreme*, and *θυμος*, *thyme*; a sort of wart, described by Celsus as hard and rough, with a narrow basis and broad top: the top is of the colour of thyme. It easily splits and bleeds. This tumour is also called *thymus*.

ACT, in general, denotes the exertion of power; and differs from power, as the effect from the cause.

Act, in *Logic*, is particularly understood of an operation of the human mind. Thus, to discern and examine are acts of the understanding; to judge and affirm are acts of the will.

Act, in the *Universities*, signifies a thesis maintained in public by a candidate for a degree; or to show the capacity and proficiency of a student.

Act of Faith, *Auto da Fe*, in the Romish church, is a solemn day held by the inquisition, for the punishment of heretics and the absolution of the innocent accused. They usually contrive the *Auto* to fall on some great festival, that the execution may pass with the more awe and regard; at least it is always on a Sunday.

The Auto da Fe may be called the last act of the inquisitorial tragedy: it is a kind of jail delivery, appointed as oft as a competent number of prisoners in the inquisition are convicted of heresy, either by their own voluntary or extorted confession, or on the evidence of certain witnesses. The process is thus: In the morning they are brought into a great hall, where they have certain habits put on, which they are to wear in the procession. The procession is led up by Dominican friars; after which come the penitents, some with san-benitos and some without, according to the nature of their crimes; being all in black coats without sleeves, and barefooted, with a wax candle in their hands. These are followed by the penitents who have narrowly escaped being burnt, who over their black coats have flames painted, with their points turned downwards, *fuego revolto*. Next come the negative and relapsed, who are to be burnt, having flames on their habits pointing upwards. After these come such as profess doctrines contrary to the faith of Rome, who, besides flames pointed upwards, have their picture painted on their breasts, with dogs, serpents, and devils, all open-mouthed, about it. Each prisoner is attended with a familiar of the inquisition; and those to be burnt have also a Jesuit on each hand, who are continually preaching to them to abjure. After the prisoners comes a troop of familiars on horseback; and after them the inquisitors, and other officers of the court, on mules; last of all, the inquisitor-general on a white horse, led by two men with black hats and green hat-bands. A scaffold is erected in the *Terreiro de Paço*, big enough for two or three thousand people; at one end of which are the prisoners, at the other the inquisitors. After a sermon made up of encomiums on the inquisition, and invectives against heretics, a priest ascends a desk near the middle of the scaffold, and having taken the abjuration of the penitents, recites the final sentence of those who are to be put to death; and delivers them to the secular arm, earnestly beseeching at the same time the secular power not to touch their blood, or put their lives in danger. The prisoners being thus in the hands of the civil magistrate, are presently loaded with chains, and carried first to the secular jail, and from thence in an hour or two brought before the civil judge; who, after asking in what religion they intend to die, pronounces sentence on such as declare they die in the communion of the church of Rome, that they shall be first strangled, and then burnt to ashes; on such as die in any other faith, that they be burnt alive. Both are immediately carried to the Ribera, the place of execution, where there are as many stakes set up as there are prisoners to be burnt, with a quantity of dry furze about them. The stakes of the professed, that is, such as persist in their heresy, are about four yards high, having a small board towards the top for the prisoner to be seated on. The negative and relapsed being first strangled and burnt, the professed mount their stakes by a ladder; and the Jesuits, after several repeated exhortations to be reconciled to the church, part with them, telling them they leave them to the devil, who is standing at their elbow to receive their souls, and carry them with him into the flames of hell. On this a great shout is raised; and the cry is, Let the dogs' *beards be made;* which is done by thrusting flaming furzes fastened to long poles against their faces, till their faces are burnt to a coal, which is accompanied with the loudest acclamations of joy. At last, fire is set to the furze at the bottom of the stake, over which the professed are chained so high that the top of the flame seldom reaches higher than the seat they sit on, so that they rather seem roasted than burnt. There cannot be a more atrocious spectacle, yet it is beheld by all sexes and ages with transports of joy and satisfaction.

Act, in *Dramatic Poetry*, signifies a certain division or part of a play, designed to give some respite both to the actors and spectators. The Romans were the first who divided their theatrical pieces into acts; for no such divisions appear in the works of the first dramatic poets Their pieces indeed consisted of several parts or divisions, which they called *protasis*, *epitasis*, *catastasis*, and *catastrophe*; but these divisions were not marked by any real interruptions in the theatre. Nor does Aristotle mention any thing of acts in his *Art of Poetry*. But, in the time of Horace, all regular and finished pieces were divided into five acts.

> *Neve minor neu sit quinto productior actu*
> *Fabula, quæ posci vult, et spectata reponi.*
>
> If you would have your play deserve success,
> Give it five acts complete, nor more nor less.
>
> Francis.

The first act, according to some critics, besides introducing upon the stage the principal characters of the play, ought to propose the argument or subject of the piece; the second, to exhibit this to the audience, by carrying the fable into execution; the third, to raise obstacles and difficulties; the fourth, to remove these, or raise new ones in the attempt; and the fifth, to conclude the piece, by introducing some accident that may unravel the whole affair. This division, however, is not essentially necessary, but may be varied according to the humour of the author or the nature of the subject.

. Act, among lawyers, is an instrument in writing for declaring or justifying the truth of any thing; in which sense records, decrees, sentences, reports, certificates, &c. are called *acts*.

Act of Parliament is a positive law, consisting of two parts, the words of the act, and its true sense and meaning; which being joined, make the law. The words of acts of parliament should be taken in a lawful sense. Cases of the same nature are within the intention, though without the letter, of the act; and some acts extend by equity to things not mentioned therein.

Acts also denote the deliberations and resolutions of an assembly, senate, or convention; as acts of parliament, &c.; likewise matters of fact transmitted to posterity in certain authentic books and memoirs.

Acta Consistorii, the edicts or declarations of the council of state of the Roman emperors. These edicts were generally expressed in such terms as these: "The august emperors, *Dioclesian* and *Maximin*, in council declare, That the children of decurions shall not be exposed to wild beasts in the amphitheatre."—The senate and soldiers often swore, either through abject flattery or by compulsion, upon the edicts of the emperor, as we do upon the Bible. And the name of Apidius Merula was erased by Nero out of the register of senators, because he refused to swear upon the edicts of the Emperor Augustus.

Acta Diurna, was a sort of Roman gazette, containing an authorized narrative of the transactions worthy of notice which happened at Rome. Petronius has given us a specimen of the *acta diurna* in his account of Trimalchi; and as it may not perhaps be unentertaining to see how exactly a Roman newspaper runs in the style of an English one, the following articles are extracted from it:

"On the 26th of July, 30 boys and 40 girls were born at Trimalchi's estate at Cuma.

"At the same time a slave was put to death for uttering disrespectful words against his lord.

"The same day a fire broke out in Pompey's gardens, which began in the night, in the steward's apartment."

Acta Populi, among the Romans, were journals or registers of the daily occurrences; as assemblies, trials, executions, buildings, births, marriages, deaths, &c. of illustrious persons, and the like. These were otherwise called *Acta Publica* and *Acta Diurna*, or simply *Acta*. The Acta differed from Annals, in that only the greater and more important matters were in the latter, and those of less note were in the former. Their origin is attributed to Julius Cæsar, who first ordered the keeping and making public the acts of the people. Some trace them higher, to Servius Tullius; who, to discover the number of persons born, dead, and alive, ordered that the next of kin, upon a birth, should put a certain piece of money into the treasury of Juno Lucina; upon a death, into that of Venus Libitina: the like was also to be done upon assuming the toga virilis, &c. Under Marcus Antoninus, this was carried further: persons were obliged to notify the births of their children, with their names and surnames, the day, consul, and whether legitimate or spurious, to the prefects of the *Ærarium Saturni*, to be entered in the public acts; though before this time the births of persons of quality appear to have been thus registered.

Acta Senatus, among the Romans, were minutes of what passed and was debated in the senate-house. These were also called *Commentarii*, and by a Greek name *ὑπομνήματα*. They had their origin in the consulship of Julius Cæsar, who ordered them both to be kept and published. The keeping of them was continued under Augustus, but the publication was abrogated. Afterwards all writings relating to the decrees or sentences of the judges, or what passed and was done before them, or by their authority, in any cause, were also called by the name *Acta*: in which sense we read of civil acts, criminal acts, intervenient acts; *acta civilia*, *criminalia*, *intervenientia*, &c.

Acts of the Apostles, one of the sacred books of the New Testament, containing the history of the infant church during the space of 29 or 30 years, from the ascension of our Lord to the year of Christ 63. It was written by St Luke, and addressed to Theophilus, the person to whom the evangelist had before dedicated his Gospel. We here find the accomplishment of several of the promises made by our Saviour; his ascension, the descent of the Holy Ghost, the first preaching of the apostles, and the miracles whereby their doctrines were confirmed; an admirable picture of the manners of the primitive Christians; and, in short, every thing that passed in the church till the dispersion of the apostles, who separated themselves in order to propagate the gospel throughout the world. From the period of that separation, St Luke quits the history of the other apostles, who were then at too great a distance from him, and confines himself more particularly to that of St Paul, who had chosen him for the companion of his labours. He follows that apostle in all his missions, and even to Rome itself: for it appears that the Acts were published in the second year of St Paul's residence in that city, or the 36th year of the Christian era, and in the ninth or tenth year of Nero's reign. The style of this work, which was originally composed in Greek, is much purer than that of the other canonical writers; and it is observable that St Luke, who was much better acquainted with the Greek than with the Hebrew language, always, in his quotations from the Old Testament, makes use of the Septuagint version. The council of Laodicea places the Acts of the Apostles among the canonical books, and all the churches have acknowledged it as such without any controversy.

There were several *spurious* Acts of the Apostles; particularly, 1. *Acts*, supposed to be written by Abdias, the pretended bishop of Babylon, who gave out that he was ordained bishop by the apostles themselves when they were upon their journey into Persia. 2. *The Acts of St Peter*: this book came originally from the school of the Ebionites. 3. *The Acts of St Paul*; which is entirely lost. Eusebius, who had seen it, pronounces it of no authority. 4. *The Acts of St John the Evangelist*; a book made use of by the Encratites, Manichæans, and Priscillianists. 5. *The Acts of St Andrew*; received by the Manichæans, Encratites, and Apotactics. 6. *The Acts of St Thomas the Apostle;* received particularly by the Manichæans. 7. *The Acts of St Philip.* This book the Gnostics made use of. 8. *The Acts of St Matthias.* Some have imagined that the Jews for a long time had concealed the original Acts of the life and death of St Matthias, written in Hebrew; and that a monk of the abbey of St Matthias at Treves, having got them out of their hands, procured them to be translated into Latin, and published them; but the critics will not allow them to be genuine.

Acts of Pilate, a relation sent by Pilate to the Emperor Tiberius, concerning Jesus Christ, his death, resurrection, ascension, and the crimes of which he was convicted before him.[1] It was a custom among the Romans, that the proconsuls and governors of provinces should draw up acts, or memoirs, of what happened in the course of their government, and send them to the emperor and senate. The genuine *acts* of Pilate were sent by him to Tiberius, who reported them to the senate; but they were rejected by that assembly, because not immediately addressed to them; as is testified by Tertullian, in his *Apol.* cap. 5. and 20, 21. The heretics forged acts in imitation of them: in the reign of the Emperor Maximin, the Gentiles, to throw an odium on the Christian name, spread about spurious Acts of Pilate; which the emperor, by a solemn edict, ordered to be sent into all the provinces of the empire, and enjoined the schoolmasters to teach and explain them to their scholars, and make them learn them by heart. These acts, both the genuine and the spurious, are lost. There is indeed extant, in the Pseudo-Hegesippus, a letter from Pilate to the Emeprор Claudius, concerning Jesus Christ;[2] but it discovers itself at first sight to be spurious.

ACTÆ were meadows of remarkable verdure and luxuriancy near the sea-shore, where the Romans used to indulge themselves to a great degree in softness and delicacy of living. The word is used in this sense by Cicero and Virgil; but Vossius thinks it can only be used in speaking of Sicily, as these two authors did.

ACTÆA, HERB-CHRISTOPHER, or BANE-BERRIES.

ACTÆON, in fabulous history, the son of Aristæus and Autonöe; a great hunter. He was transformed by Diana into a stag, because he looked on her while bathing; and was devoured by his own dogs. The effect of impertinent curiosity and expensive pleasures seem to be the moral of the fable.

ACTIAN GAMES, in Roman antiquity, were solemn games instituted by Augustus, in memory of his victory over Mark Antony at Actium, held every fifth year, and celebrated in honour of Apollo, since called *Actius.* Hence *Actian* Years, an era commencing from the battle of Actium, called the *Era of Augustus.* Virgil insinuates them to have been instituted by Æneas, from that passage, Æn. iii. v. 280:

> Actiaque Iliacis celebramus littora ludis.

But this he only does by way of compliment to Augustus; attributing that to the hero from whom he descended, which was done by the emperor himself; as is observed by Servius.

ACTINIA, in *Zoology,* a genus belonging to the order of *Vermes mollusca,* called *Animal Flowers* and *Sea Anemonies.*

ACTIO, in Roman antiquities, an action at law in a court of justice. The formalities used by the Romans, in judicial actions, were these: If the difference failed to be made up by friends, the injured person proceeded *in jus reum vocare,* to summon the offending party to the court, who was obliged to go, or give bond for his appearance.

The offending party might be summoned into court *viva voce,* by the plantiff himself meeting the defendant, declaring his intention to him, and commanding him to go before the magistrate and make his defence. If he would not go willingly, he might drag and force him along, unless he gave security for his appearance on some appointed day. If he failed to appear on the day agreed on, then the plaintiff, whensoever he met him, might take him along with him by force, calling any by-standers to bear witness, by asking them *visne antestari?* The by-standers upon this turned their ear toward him in token of their consent. To this Horace alludes in his satire against the impertinent, lib. i. sat. 9.

Both parties being met before the pretor, or other supreme magistrate presiding in the court, the plaintiff proposed the action to the defendant, in which he designed to prosecute him. This they termed *edere actionem;* and was commonly performed by writing it in a tablet, and offering it to the defendant, that he might see whether he had better stand the suit or compound.

In the next place came the *postulatio actionis,* or the plaintiff's petition to the pretor for leave to prosecute the defendant in such an action. The petition was granted by writing at the bottom of it *actionem do,* or refused by writing in the same manner *actionem non do.*

The petition being granted, the plaintiff *vadabatur reum,* *i. e.* obliged him to give sureties for his appearance on such a day in the court; and this was all that was done in public before the day fixed upon for the trial.

In the mean time, the difference was often made up either *transactione,* by letting the cause fall as dubious; or *pactione,* by composition for damages amongst friends.

On the day appointed for hearing, the pretor ordered the several bills to be read, and the parties summoned by an *accensus,* or beadle.

Upon the non-appearance of either party, the defaulter lost his cause: if they both appeared, they were said *se stetisse;* and then the plaintiff proceeded *litem sive actionem intendere, i. e.* to prefer his suit; which was done in a set form of words, varying according to the difference of the actions. After this the plaintiff desired judgment of the pretor, that is, to be allowed a *judex* or *arbiter,* else the *recuperatores* or *centumviri.* These he requested for the hearing and deciding the business: but none of them could be desired but by the consent of both parties.

The pretor, having assigned them their judges, defined and determined the number of witnesses to be admitted, to hinder the protracting of the suit; and then the parties proceeded to give their caution, that the judgment, whatever it was, should stand and be performed on both sides. The judges took a solemn oath to be impartial; and the parties took the *juramentum calumniæ.* Then the trial began with the assistance of witnesses, writings, &c. which was called *disceptatio causæ.*

ACTION, in a general sense, implies nearly the same thing with Act. Grammarians, however, observe some distinction between *action* and *act;* the former being generally restricted to the common or ordinary transactions, whereas the latter is used to express those which are remarkable. Thus, we say it is a good *action* to comfort the unhappy; it is a generous *act* to deprive ourselves of what is necessary for their sake. The wise man proposes to himself an honest end in all his actions; a prince ought to mark every day of his life with some act of greatness. The Abbé Girard makes a further distinction between the words *action* and *act.* The former, according to him, has more relation to the power that acts than the latter; whereas the latter has more relation to the effect produced than the former: and hence the one is properly the attribute of the other. Thus, we may properly say, "Be sure to preserve a presence of mind in all your actions, and take care that they be all acts of equity."

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[1] Eusebii *Hist. Eccl.* lib. ii. cap. 2. and ix. 5.

[2] Cave *Hist. Literar.*

Action, in *Commerce*, is a term used abroad for a certain part or share of a public company's capital stock. Thus, if a company has 400,000 livres capital stock, this may be divided into 400 actions, each consisting of 1000 livres. Hence a man is said to have two, four, &c. actions, according as he has property of 2000, 4000, &c. livres capital stock. The transferring of actions abroad is performed much in the same manner as stocks are with us.

Action, in *Mechanics*, implies either the effort which a body or power makes against another body or power, or the effect itself of that effort.

As it is necessary, in works of this kind, to have a particular regard to the common language of mechanics and philosophers, we have given this double definition; but the proper signification of the term is the motion which a body really produces, or tends to produce, in another; that is, such is the motion it would have produced had nothing hindered its effect.

All power is nothing more than a body actually in motion, or which tends to move itself; that is, a body which would move itself if nothing opposed it. The action therefore of a body is rendered evident to us by its motion only; and consequently we must not fix any other idea to the word action than that of actual motion, or a simple tendency to motion. The famous question relating to *vis viva* and *vis mortua* owes, in all probability, its existence to an inadequate idea of the word action; for had Leibnitz and his followers observed that the only precise and distinct idea we can give to the word force or action reduces it to its effect, that is, to the motion it actually produces or tends to produce, they would never have made that curious distinction.

Quantity of Action, a name given by M. de Maupertuis, in the Memoirs of the Parisian Academy of Sciences for 1744, and those of Berlin for 1746, to the product of the mass of a body by the space which it runs through, and by its celerity. He lays it down as a general law, that, "in the changes made in the state of a body, the quantity of action necessary to produce such change is the least possible." This principle he applies to the investigation of the laws of refraction, of equilibrium, &c. and even to the ways of acting employed by the Supreme Being. In this manner M. de Maupertuis attempts to connect the metaphysics of final causes with the fundamental truths of mechanics; to show the dependence of the collision of both elastic and hard bodies upon one and the same law, which before had always been referred to separate laws; and to reduce the laws of motion and those of equilibrium to one and the same principle.

Action, in *Law*, is a demand made before a judge for obtaining what we are legally entitled to demand, and is more commonly known by the name of *law-suit* or *process*.

Action, in *Oratory*, is the outward department of the orator, or the accommodation of his countenance, voice, and gesture, to the subject of which he is treating.

Action, in *Painting* and *Sculpture*, is the attitude or position of the several parts of the face, body, and limbs, of such figures as are represented, and whereby they seem to be really actuated by passions. Thus, we say, the action of such a figure finely expresses the passions with which it is agitated; we also use the same expression with regard to animals.

Action, in *Physiology*, is applied to the functions of the body, whether vital, animal, or natural.—The *vital* functions, or actions, are those which are absolutely necessary to life, and without which there is no life; as the action of the heart, lungs, and arteries. On the action and re-action of the solids and fluids on each other, depend the vital functions. The pulse and respiration are the external signs of life. Vital diseases are all those which hinder the influx of the venous blood into the cavities of the heart, and the expulsion of the arterial blood from the same.—The *natural* functions are those which are instrumental in repairing the several losses which the body sustains; for life is destructive of itself, its very offices occasioning a perpetual waste. The manducation of food, the deglutition and digestion thereof, also the separation and distribution of the chyle and excrementitious parts, &c. are under the head of natural functions, as by these our aliment is converted into our nature. They are necessary to the continuance of our bodies.—The *animal* functions are those which we perform at will, as muscular motion, and all the voluntary actions of the body: they are those which constitute the senses of touch, taste, smell, sight, hearing, perception, reasoning, imagination, memory, judgment, affections of the mind. Without any or all of them a man may live, but not so comfortably as with them.

Action, in *Poetry*, the same with subject or fable. Critics generally distinguish two kinds, the principal and the incidental. The principal action is what is generally called the *fable*, and the incidental an *episode*.

ACTIONARY, or Actionist, a proprietor of stock in a trading company.

ACTIVE denotes something that communicates action or motion to another; in which acceptation it stands opposed to passive.

Active, in *Grammar*, is applied to such words as express action, and is therefore opposed to passive. The active performs the action, as the passive receives it. Thus we say, a verb *active*, a conjugation *active*, &c. or an *active* participle.

Active Verbs are such as do not only signify doing, or acting, but have also nouns following them, to be the subject of the action or impression. Thus, *to love*, *to teach*, are verbs *active*; because we can say, *to love a thing*, *to teach a man*. Neuter verbs also denote an action, but are distinguished from active verbs, in that they cannot have a noun following them: such are, *to sleep*, *to go*, &c. Some grammarians, however, make three kinds of active verbs; the *transitive*, where the action passes into a subject different from the agent; *reflected*, where the action returns upon the agent; and *reciprocal*, where the action returns mutually upon the two agents who produced it.

ACTIVITY, in general, denotes the power of acting, or the active faculty.

Sphere of Activity, the whole space in which the virtue, power, or influence of any object is exerted.

ACTIUM, in *Ancient Geography*, a town situated on the coast of Acarnania, in itself inconsiderable, but famous for a temple of Apollo, a safe harbour, and an adjoining promontory of the same name, in the mouth of the Sinus Ambracius, opposite to Nicopolis, on the other side of the bay. It became famous on account of Augustus's victory over Antony and Cleopatra, and for quinquennial games instituted there, called *Actia*, or *Ludi Actiaci*. Hence the epithet *Actius*, given to Apollo. (Virgil.) *Actiaca æra*, a computation of time from the battle of Actium.

ACTIUS, in mythology, a surname of Apollo, from Actium, where he was worshipped.

ACTON, a large village in the county of Middlesex and hundred of Ossulton, about five miles from London. It was formerly frequented on account of some saline springs, which have now fallen into disuse. The grand junction canal, in its way from Uxbridge to London, passes through the parish. It is a rectory in the patronage of the bishop of London. The number of inhabitants in 1811 were 1674; in 1821, 1929; and in 1831, 2453.

ACTOR, in general, signifies a person who acts or performs something.

Actor, among *Civilians*, the proctor or advocate in civil courts or causes; as *Actor ecclesiæ* has been sometimes used for the advocate of the church, *actor dominicus* for the lord's attorney, *actor villæ* for the steward or head bailiff of a village.

Actor, in the *Drama*, is a person who represents some part or character. See Drama. Actors were highly honoured at Athens: at Rome they were despised, and not only denied all rank among the citizens, but even when any citizen appeared upon the stage, he was expelled his tribe, and deprived of the right of suffrage by censors. The French have in this respect adopted the ideas of the Romans; the English those of the Greeks. Women actors were unknown to the ancients, among whom men always performed the female character; and hence one reason for the use of masks among them. Actresses are by some said not to have been introduced on the English stage till after the restoration of King Charles II. who has been charged with contributing to the corrupting of our manners by importing this usage from abroad. But this can be but partly true, for Prynne, in his *Histriomastix*, speaks of women actors as prostitutes; which, as the queen of Charles I. sometimes acted in the court dramas, was one occasion of the severe prosecution brought against him for that book. See Bibliography, sect. 6.

Actor, the name of several persons in *fabulous history*. One *Actor* among the Aurunci is described by Virgil as a hero of the first rank. (*Æn.* xii.)

ACTORUM Tabulæ, in antiquity, were tables instituted by Servius Tullius, in which the births of children were registered. They were kept in the treasury of Saturn.

ACTUAL, something that is real and effective, or that exists truly and absolutely. Thus, philosophers use the terms *actual* heat, *actual* cold, &c. in opposition to *virtual* or *potential*. Hence, among physicians, a red-hot iron, or fire, is called an actual cautery, in distinction from cauteries, or caustics, that have the power of producing the same effect upon the animal solids as actual fire, and are called *potential* cauteries. Boiling water is actually hot; brandy, producing heat in the body, is potentially hot, though of itself cold.

Actual Sin, that which is committed by the person himself, in opposition to *original sin*, or that which he contracted from being a child of Adam.

ACTUARIÆ Naves, a kind of long and light ships among the Romans, thus denominated because they were chiefly designed for swiftness and expedition. They correspond to what the French call *brigantines*.

ACTUARIUS, a celebrated Greek physician of the thirteenth century, and the first Greek author who has treated of mild purgatives, such as cassia, manna, senna, &c. He is the first also who mentions distilled waters. His works were printed in one volume folio, by Henry Stephens, in 1567.

Actuarius, or Actarius, a notary, or officer, appointed to write the acts or proceedings of a court, or the like. In the eastern empire, the actuarii were properly officers who kept the military accounts, received the corn from the *susceptores*, or storekeepers, and delivered it to the soldiers.

ACTUATE, to bring into act, or put a thing in action. Thus an agent is said, by the schoolmen, to *actuate* a power, when it produces an act in a subject. Thus the mind may be said to *actuate* the body; and thus a medicine is said, by ancient physicians, to be actuated or brought into action, when by means of the vital heat it is made to produce its effect.

ACTUS, in *Ancient Architecture*, a measure, in length equal to 120 Roman feet. In *Ancient Agriculture* the word signified the length of one furrow, or the distance a plough goes before it turns.

Actus Intervicinalis, a space of ground four feet in breadth, left between the lands as a path or way.

Actus Major, or *Actus Quadratus*, a piece of ground in a square form, whose side was equal to 120 feet, equal to half the jugerum.

Actus Minimus was a quantity of land 120 feet in length and four in breadth.

ACUANITES, in *Ecclesiastical History*, the same with those called more frequently Manichees. They took the name from Acua, a disciple of Thomas, one of the twelve apostles.

ACULEATE, or Aculeati, a term applied to any plant or animal armed with prickles.

ACULEI, the prickles of animals or of plants.

ACULER, in the *Manege*, is used for the motion of a horse when, in working upon volts, he does not go far enough forward at every time or motion, so that his shoulders embrace or take in too little ground, and his croupe comes too near the centre of the volt. Horses are naturally inclined to this fault in making demi-volts.

ACUMINA, in *Antiquity*, a kind of military omen, most generally supposed to have been taken from the points or edges of darts, swords, or other weapons.

ACUNA, Christopher de, a Spanish Jesuit, born at Burgos. He was admitted into the society in 1612, being then but 15 years of age. After having devoted some years to study, he went to America, where he assisted in making converts in Chili and Peru. In 1640 he returned to Spain, and gave the king an account how far he had succeeded in the commission he had received to make discoveries on the river of the Amazons; and the year following he published, at Madrid, in a quarto volume, a description of this river, entitled *Nuevo Descubrimiento del Gran Rio de las Amazonas*. He was ten months together upon this river, having had instructions to inquire into every thing with the greatest exactness, that his Majesty might thereby be enabled to render the navigation more easy and commodious. He went aboard a ship at Quito with Peter Texiern, who had already been so far up the river, and was therefore thought a proper person to accompany him in this expedition. They embarked in February 1639, but did not arrive at Para till the December following. It is thought that the revolution of Portugal, by which the Spaniards lost Brazil, and the colony of Para, at the mouth of the river of the Amazons, led to the suppression of Acuna's narrative; for, as it could not be of any advantage to the Spaniards, they were afraid it might prove of service to the Portuguese, by instructing them in the navigation of that great river. M. de Gomberville, the possessor of one of the few copies that escaped, published a French translation at Paris in 1682, in 2 vols. 12mo. Acuna appears to have returned to Peru, and to have died there; but the year of his death is uncertain.

ACUPUNCTURE, the name of a surgical operation among the Chinese and Japanese, which is performed by pricking the part affected with a silver needle. They employ this operation in headachs, lethargies, convulsions, colics, &c.

ACUS, in *Ichthyology*, the trivial name of a species of Syngnathus.

ACUTE, an epithet applied to such things as terminate in a sharp point or edge; and in this sense it stands opposed to obtuse.

Acute-angled, in *Geometry*, is that which is less than a right angle, or which does not subtend 90 degrees.

Acute-angled Cone is, according to the ancients, a right cone, whose axis makes an acute angle with its side.

Acute-angled Triangle is a triangle whose three angles are all acute.

Acute Diseases, such as come suddenly to a crisis. This term is used for all diseases which do not fall under the head of chronic diseases.

Acute, in *Music*, is applied to a sound or tone that is sharp or high in comparison of some other tone. In this sense *acute* stands opposed to *grave*.

ACUTIATOR, in writers of the barbarous ages, denotes a person that whets or grinds cutting instruments; called also in ancient glossaries *acutor*, *ακονητης*, *samiarius*, *cotiarius*, &c. In the ancient armies there were *acutiatores*, a kind of smiths, retained for whetting or keeping the arms sharp.

AD, a Latin preposition, originally signifying *to*, and frequently used in composition, both with and without the *d*, to express the relation of one thing to another.

Ad Bestias, in *Antiquity*, is the punishment of criminals condemned to be thrown to wild beasts.

Ad Hominem, in *Logic*, a kind of argument drawn from the principles or prejudices of those with whom we argue.

Ad Ludos, in *Antiquity*, a sentence upon criminals among the Romans, whereby they were condemned to entertain the people by fighting either with wild beasts or with one another, and thus executing justice upon themselves.

Ad Metalla, in *Antiquity*, the punishment of such criminals as were condemned to the mines, among the Romans; and therefore called *Metallici*.

Ad Valorem, a term chiefly used in speaking of the duties or customs paid for certain goods. The duties on some articles are paid by the number, weight, measure, tale, &c.; and others are paid *ad valorem*, that is, according to their value.

ADAGE, a proverb, or short sentence, containing some wise observation or popular saying. Erasmus has made a very large and valuable collection of the Greek and Roman adages; and Mr Ray has done the same with regard to the English. We have also Kelly's Collection of Scots Proverbs.

ADAGIO, in *Music*. Adverbially, it signifies *softly*, *leisurely*; and is used to denote the slowest of all times. Used substantively, it signifies a slow movement. Sometimes this word is repeated, as *adagio adagio*, to denote a still greater retardation in time of the music.

ADALIDES, in the Spanish policy, are officers of justice for matters touching the military forces. In the laws of King Alphonsus, the adalides are spoken of as officers appointed to guide and direct the marching of the forces in time of war.

ADAM, the first of the human race, was formed by the Almighty, on the sixth day of the creation. His body was made of the dust of the earth; after which, God animated or gave it life, and Adam then became a rational creature. His heavenly Parent did not leave his offspring in a destitute state to shift for himself, but planted a garden, in which he caused to grow not only every tree that was proper for producing food, but likewise such as were agreeable to the eye, or merely ornamental. In this garden were assembled all the brute creation, and, by their Maker, caused to pass before Adam, who gave all of them names, which were judged proper by the Deity himself. In this review Adam found none for a companion to himself. This solitary state was seen by the Deity to be attended with some degree of unhappiness, and therefore he threw Adam into a deep sleep, in which condition he took a rib from his side, and, healing up the wound, formed a woman of the rib he had taken out. On Adam's awaking, the woman was brought to him; and he immediately knew her to be one of his own species, calling her his bone and his flesh, and giving her the name of *woman*, because she was taken out of man.

The first pair being thus created, God gave them authority over the inferior creation, commanding them to subdue the earth, also to increase and multiply, and fill it. They were informed of the proper food for the beasts and for them; the grass or green herbs being appointed for beasts, and fruits or seeds for man. Their proper employment also was assigned them; namely, *to dress the garden and to keep it*.

Though Adam was thus highly favoured and instructed by his Maker, there was a single tree, which grew in the middle of the garden, of the fruit of which they were not allowed to eat; being told that they should surely die in the day they ate of it. This tree was named the *tree of the knowledge of good and evil*. This prohibition, however, they soon broke through. The woman having entered into conversation with *the serpent*, was by him persuaded, that by eating of the tree she should become as wise as God himself; and accordingly, being invited by the beauty of the fruit, and its desirable property of imparting wisdom, she plucked and ate, giving her husband of it at the same time, who did likewise eat.

Before this transgression of the divine command, Adam and his wife had no occasion for clothes, neither had they any sense of shame; but immediately on eating the forbidden fruit they were ashamed of being naked, and made aprons of fig-leaves for themselves. On hearing the voice of God in the garden, they were terrified, and hid themselves; but being questioned by the Deity, they confessed what they had done, and received sentence accordingly; the man being condemned to labour, the woman to subjection to her husband, and to pain in child-bearing. They were now driven out of the garden, and their access to it prevented by a terrible apparition.

They had clothes given them by the Deity, made of the skins of beasts. In this state Adam had several children; the names of only three of whom we are acquainted with, viz. Cain, Abel, and Seth. He died at the age of 930 years.

These are all the particulars concerning Adam that we have on divine authority; but there is a vast multitude of others, all of them conjectural, part of them downright falsehoods or absurdities.

Much ingenious speculation has in modern times been expended in attempts to settle the question whether the great progenitor of the human species was white, or of a black, or at least very dark complexion. It must be confessed that discussions like these can lead to no result of the slightest moment to mankind, and therefore do not require investigation in this place. Another and a more important inquiry has been instituted, namely, whether or not all the varieties of the human species have sprung from one common stock. Dr Prichard, in his work entitled *Researches into the Physical History of Mankind*, has discussed the point in a very able manner, and arrived at the conclusion that all the tribes of the earth sprang from one family, according to the Scriptural account of the creation. After establishing this fact with respect to organized beings in general, he proceeds to the inquiry, whether there are among mankind any specific diversities, or any physical differences, of such a description that they must be looked upon as original characters, and therefore as constituting distinct species. There are four methods, he observes, of examining the question, each of which is capable of elucidating it more or less. "The first," says Dr Prichard, "or what may be termed the physiological method, is founded on a comparison of the principal facts relating to the animal economy or physiological character of the tribes to be considered, such as the term or duration of life proper to each kind, the circumstances connected with their breeding, the periods of utero-gestation, the number of progeny, the laws of the natural functions, the diseases to which each tribe is obnoxious, and the character of its faculties, instincts, and habits. If in all these circumstances, in respect to which strongly marked differences occur between species very nearly resembling each other in outward form, no material difference can be found to exist between any two races which are the subjects of comparison, a probable argument results for concluding them to be of one species. A second criterion for determining on the unity or diversity of species has been sought by many naturalists, in the capability of propagating, or sterility of the animal which is the mixed progeny of two races. The validity of this criterion has been called in question, and it seems that in some instances hybrid animals, properly so termed, are capable of procreating. Yet there is evidently in nature a principle, by which the casual intermixture of species is guarded against. It is unnecessary to repeat the remarks that were made on this subject in the place referred to, to which the reader may revert. It may suffice to observe, that on applying both of these two first methods of inquiry to the particular instance under consideration, the result seemed clearly to be, that, as far as the evidence derived from these sources extends, we have no reason to believe that there is more than one species of human beings in existence.

"A third method of inquiry is the analogical or comparative. It is resolved into the question, whether the particular diversities we have to account for are analogous to those deviations from a common type, which are known to make their appearance as varieties, in the progeny of a single race. When this appears, after due investigation, it is fair to conclude that such diversities are analogous in their nature, or resolvable into the same class of natural phenomena. This inquiry, in respect to the most remarkable varieties in the form, structure, complexion, and the other peculiarities which occur in mankind, was pursued through the remainder of the second book in as full and particular a manner as seemed requisite; and the conclusion which resulted was, that the diversities which are known in mankind are, in the most important particulars, similar in kind to the natural varieties discovered in other species of animals, and therefore, as far as we can rely upon an inference drawn from analogy, they afford no reason for supposing that there is more than one species of men.

"It was observed, that the probable inference deduced from the comparison of parallel or analogous phenomena, would be very much confirmed, if it should appear on investigation that varieties such as those which are the subject of discussion do in reality take place in particular races of men, and originate in the progeny of the same stock. And this brings us to the fourth part of our inquiry, which has been followed through the remainder of the work. In the third and the succeeding books, we have examined the history of the different races of men, and have taken notice of the instances of variety in form and complexion which appear to have arisen from the same stock, and of the most remarkable differences in physical character which exist among tribes nearly allied to each other in kindred. In the course of this inquiry we have seen that certain deviations display themselves at once in strongly marked examples, some striking phenomena of complexion or figure appearing in the immediate offspring of races, or families, in which they had been before unknown. In other instances such variations take place by slow and imperceptible degrees. It appeared from the whole of this examination, that there is no clearly traced and definite line which the tendency to variety or deviation cannot pass, and therefore no specific distinction. The character of one race passes into that of another, and this not merely in the sense often attached to such an expression, implying the want of any exact limit between them, but by actual deviation and transition. Even within the limits of one particular race it is sometimes possible to point out a wide range of varieties, and in some instances it may be shown that the most different complexions, and the greatest diversities of figure, known to exist, are to be found among tribes which appear to belong to the same nation, or family of nations."

Such are the conclusions at which Dr Prichard has arrived, after a survey of the most extensively spread nations, and indeed of all the principal departments of mankind. In the several divisions of the human family, he proves that important physical diversities have arisen, and in each of them remarkable approximations to the characters prevalent in other tribes. On the whole, he concludes, it appears that the information deduced from this fourth method of inquiry is as satisfactory as we could expect, and is sufficient to confirm, and indeed by itself to establish, the inference, that the human kind contains but one species, and therefore, by a second inference, but one race.

Adam, *Alexander*, Rector of the High School, Edinburgh, and author of several valuable works connected with Roman literature, was born on the 24th of June 1741, on a small farm which his father rented, not far from Forres, in Morayshire. He does not appear to have received any powerful direction to literary pursuits, either from the attainments of his parents or the ability of the parochial schoolmaster; but is referable to a class of men, of which Scotland can produce a very honourable list, whom the secret workings of a naturally active mind have raised above the level of their associates, and urged on to a distinction and usefulness under the severest pressure of difficulties. The gentle treatment of an old schoolmistress first taught him to like his book; and this propensity induced his parents to consent that he should learn Latin. To the imperfect instruction which he received at the parish school, he joined indefatigable study at home, notwithstanding the scanty means and poor accommodation of his father's house. Before he was sixteen he had read the whole of Livy, in a copy of the small Elzevir edition, which he had borrowed from a neighbouring clergyman, omitting for the present all such passages as his own sagacity and Cole's *Dictionary* did not enable him to construe. It was before day-break, during the mornings of winter, and by the light of splinters of bog-wood dug out of an adjoining moss, that he prosecuted the perusal of this difficult classic; for, as the whole family were collected round the only fire in the evening, he was prevented by the noise from reading with any advantage; and the day-light was spent at school.

In the autumn of 1757 he was a competitor for one of those bursaries, or small exhibitions, which are given by the university of Aberdeen to young men who distinguish themselves for their classical attainments; but as the prize was awarded to the best written exercises, and as Adam, with all his reading, had not yet been accustomed to write, he was foiled by some youth who had been more fortunate in his means of instruction. About the same time Mr Watson, a relation of his mother's, and one of the ministers of the Canongate, sent him a tardy invitation to come to Edinburgh, "provided he was prepared to endure every hardship for a season,"—a condition not likely to appal one who yet knew nothing of life but its hardships. The interest of Mr Watson procured him free admission to the lectures of the different professors; and as he had now also access to books in the College Library, his literary ardour made him submit with cheerfulness to the greatest personal privations. Eighteen months of assiduous application enabled him to repair the defects of his early tuition, and to obtain, after a comparative trial of candidates, the head mastership of the foundation known by the name of Watson's Hospital. At this period he was only nineteen, on which account the governors of the institution limited the appointment to half a year; but his steadiness and ability speedily removed their scruples. After holding the situation for three years, he was induced, by the prospect of having more leisure for the prosecution of his studies, to resign it, and become private tutor to the son of Mr Kincaid, a wealthy citizen, and afterwards Lord Provost of Edinburgh; and it was in consequence of this connection that he was afterwards raised to the office for which he was so eminently qualified. He taught in the High School, for the first time, in April 1765, as substitute for Mr Matheson the rector; in consequence of whose growing infirmities, an arrangement was made, by which he retired on a small annuity, to be paid from the profits of the class; and Mr Adam was confirmed in the rectorship on the 8th of June 1768.

From this period the history of his life is little more than the history of his professional labours and of his literary productions. No sooner was he invested with the office, than he gave himself up with entire devotion to the business of his class, and the pursuits connected with it. For forty years his day was divided with singular regularity between the public duties of teaching and that unwearied research and industry in private which enabled him, amidst the incessant occupation of a High School master's life, to give to the world such a number of accurate and laborious compilations. So entirely did these objects of public utility engross his mind, that he mixed but little with society, and considered every moment as lost that was not dedicated in some way or other to the improvement of youth. Few men certainly could adopt, with more truth and propriety, the language of Horace, both with regard to his own feelings and the objects on which he was occupied:

> ...... mihi tarda fluunt ingrataque tempora, quæ spem
> Consiliumque morantur agendi gnaviter id, quod
> Æque pauperibus prodest, locupletibus æque,
> Æque, neglectum, pueris senibusque nocebit.
>
> *Epist.* i. 1. 23.

The rector's class, which in the High School is the most advanced of five, consisted of no more than between thirty and forty boys when Dr Adam was appointed. His celebrity as a classical teacher, joined to the progress of the country in wealth and population, continued to increase this number up to the year of his death. His class-list for that year contained 167 names,—the largest number that had ever been collected in one class, and, what is remarkable, equal to the amount of the whole five classes during the year when he first taught in the school.

He performed an essential service to the literature of his country by introducing, in his own class, an additional hour of teaching for Greek and Geography; neither of which branches seems to have been contemplated in the original formation of the school. The introduction of Greek, which he effected a year or two after his election, was regarded by some professors of the university as a dangerous innovation, and an unwarrantable encroachment on the province of the Greek chair; and the measure was accordingly resisted (though, it is satisfactory to think, unsuccessfully) by the united efforts of the Senatus Academicus, in a petition and representation to the town-council, drawn up and proposed by the celebrated Principal of the university, Dr Robertson. This happened in 1772.

It is not possible for a man of principle and ordinary affections to be occupied in training a large portion of the youth of his country to knowledge and virtue, without feeling a deep responsibility, and a paramount interest in their progress and welldoing. That such were Dr Adam's feelings is proved, not less by the whole tenor of his life, than by his mode of conducting the business of his class; by the free scope and decided support he gave to talent, particularly when the possessor of it was poor and friendless; by the tender concern with which he followed his pupils into life; and by a test not the least unequivocal, the enthusiastic attachment and veneration which they entertain for his memory. In his class-room, his manner, while it imposed respect, was kindly and conciliating. He was fond of relieving the irksomeness of continued attention by narrating curious facts and amusing anecdotes. In the latter part of his life, he was perhaps too often the hero of his own tale; but there was something amiable even in this weakness, which arose from the vanity of having done much good, and was totally unmixed with any alloy of selfishness.

Dr Adam's first publication was his *Grammar*, which appeared in 1772. He had two principal objects in compiling it;—to combine the study of English and Latin grammar, so that they might mutually illustrate each other; and to supersede the preposterous method of teaching Latin by a grammar composed in that language, and of overloading the memory with rules in Latin hexameters, for almost every fact and every anomaly in its grammatical structure. The change he proposed, reasonable as it was, could not be effected without running counter to confirmed prejudices, and interfering with established books. Although, therefore, the grammar met with the approbation of some eminently good judges, particularly of Bishop Lowth, the author had no sooner adopted it in his own class, and recommended it to others, than a host of enemies rose up against him, and he was involved in much altercation and vexatious hostility with the town-council and the four under masters. Dr George Stewart, then professor of humanity, was related to Ruddiman, whose grammar Dr Adam's was intended to supersede; and to this cause may be traced the commencement of the determined opposition that was long made to any change. In these squabbles, the acrimony displayed by some of his adversaries now and then altered the natural suavity of Dr Adam's temper; and his high notions of independence, and contempt of presumptuous ignorance, led him perhaps to neglect too much those easy arts of conciliation, which enable a man, without the slightest compromise of his integrity, "to win his way by yielding to the tide."

His work on *Roman Antiquities* was published in 1791, and has contributed, more than any of his other productions, to give him a name as a classical scholar. The vast variety of matter, the minuteness and accuracy of the details, the number and fidelity of the references, the constant bearing the work has upon the classics, and the light it throws on them at every step, were soon perceived and appreciated over the whole island. These solid excellencies abundantly compensate for a certain air of heaviness, and the absence of the lighter graces of interesting style and manner. His reader follows him as he would do a faithful guide, through a strange and difficult country, with a feeling of perfect assurance that he will arrive at the end of his journey, if not by the pleasantest road, at least by the most direct and secure. The *Roman Antiquities* is now adopted as a class-book in many of the English schools; and, even in those where the influence of custom opposes innovation, it is found in every master's library, and recommended by him to his advanced pupils for private reading and reference.

In 1794 he published his *Summary of Geography and History*, in one thick 8vo volume of 900 pages, which had grown in his hands to this size from a small treatise on the same subject, printed for the use of his pupils in 1784. The object of this work was to connect the study of the classics with that of general knowledge; and it accordingly contains a curious compound of interesting matter, unwieldy as a school-book, and not always arranged in the most luminous or engaging order, but valuable to the young student for its succinct account of the first principles of astronomical, mathematical, and physical science, and for the mass it contains of geographical and historical information, especially with regard to the fabulous ages of antiquity.

His *Classical Biography*, published in 1800, is the least in request of all his works; a circumstance owing, perhaps, to the more comprehensive and popular plan of Lempriere's *Classical Dictionary*. It exhibits, however, ample proofs of well-directed industry; and in the number and unfailing accuracy of the references, furnishes an excellent index to the best sources of information, even where the book itself may be thought meagre and scanty.

His last work was his *Latin Dictionary*, which appeared in 1805, printed, like every other production of his pen, in the most unassuming form, and with the utmost anxiety to condense the greatest quantity of useful knowledge into the smallest bulk, and afford it to the student at the cheapest rate. It was intended chiefly for the use of schools, and to be followed by a larger work, containing copious illustrations of every word in the language. The character which he had acquired by his former works for patient research and correct detail stamped a high and deserved authority on this book. The clear account of the different meanings of words, the explanation of idioms, and happy translation of difficult passages, which abound, particularly in the latter half, are admirably well adapted to remove the difficulties of the younger student, and render the work, notwithstanding the modesty of its pretensions, equally valuable to the more advanced. It is much to be regretted he did not live to complete his larger work on the extended scale on which the latter part of the small one is executed. He had proceeded as far as the word *Comburo*, with a plenitude of illustration that would have made the work a treasure of Latinity, when he was seized in school with an apoplectic affection; occasioned, perhaps, by the inteneness of his application, and the small portion of sleep he allowed himself,—certainly not by his mode of living, which was simple and abstemious to an extreme degree. He lingered five days under the disease. Amidst the wanderings of mind that accompanied it, he was constantly reverting to the business of the class, and addressing his boys; and in the last hour of his life, as he fancied himself examining on the lesson of the day, he stopped short, and said, "But it grows dark, you may go;" and almost immediately expired. He died on the 18th of December 1809, at the age of 68. The magistrates of Edinburgh, whose predecessors had not always been alive to his merits, showed their respect for his memory by a public funeral. A short time before his death, he was solicited by some of his old pupils to sit to Mr Raeburn for his portrait, which was executed in the best style of that eminent artist, and placed, as a memorial of their gratitude and respect, in the library of the High School.

He was twice married; first in 1775, to Miss Munro, eldest daughter of the minister of Kinloss, by whom he had several children, the last of whom died within a few days of his father; and in 1789, to Miss Cosser, daughter of Mr Cosser, Comptroller of Excise, who, with two daughters and a son, are still alive. (II.)

ADAM, *Melchior*, lived in the seventeenth century. He was born in the territory of Grotkaw in Silesia, and educated in the college of Brieg, where he became a firm Protestant, and was enabled to pursue his studies by the liberality of a person of quality, who had left several exhibitions for young students. He was appointed rector of a college at Heidelberg, where he published, in the year 1615, the first volume of his *Vitæ Germanorum Philosophorum*, &c. This volume, which treated of philosophers, poets, writers on polite literature, and historians, &c. was followed by three others: that which treated of divines was printed in 1619; that of the lawyers came next; and, finally, that of the physicians: the last two were published in 1620. All the learned men whose lives are contained in these four volumes lived in the sixteenth or beginning of the seventeenth century, and are either Germans or Flemings; but he published in 1618 the lives of twenty divines of other countries in a separate volume, entitled *Decades duæ, continentes Vitas Theologorum exterorum principum*. All his divines are Protestants. The Lutherans were not pleased with him, for they thought him partial, and will not allow his work to be a proper standard of the learning of Germany. He was the author of some other works of less consequence than his Lives. His industry as a biographer is commended by Bayle, who acknowledges his obligations to his labours. He died in 1622.

ADAM, *Robert*, an eminent architect, was born at Edinburgh in the year 1728. He was the second son of William Adam, Esq. of Maryburgh, in the county of Fife, who has also left some respectable specimens of his genius and abilities as an architect in Hopetoun-house and the Royal Infirmary of Edinburgh, which were erected from designs executed by him. And it was perhaps owing to the fortunate circumstance of his father's example that young Adam first directed his attention to those studies, in the prosecution of which he afterwards rose to such distinguished celebrity. He received his education at the university of Edinburgh, where he had an opportunity of improving and enlarging his mind, by the conversation and acquaintance of some of the first literary characters of the age, who were then rising into reputation, or have since established their fame as historians and philosophers. Among these were Mr Hume, Dr Robertson, Dr Smith, and Dr Ferguson, who were the friends and companions of the father, and who continued through life their friendship and attachment to the son.

In the year 1754, Mr Adam travelled to the Continent, with a view to extend his knowledge and improve his taste in architecture, and resided in Italy for three years. Here he surveyed and studied those noble specimens of ancient grandeur which the magnificent public edifices of the Romans, even in ruins, still exhibit. In tracing the progress of architecture and the other fine arts among the Romans, Mr Adam observed that they had visibly declined previously to the time of Dioclesian; but he was also convinced that the liberal patronage and munificence of that emperor had revived, during his reign, a better taste for architecture, and had formed artists who were capable of imitating the more elegant style of a purer age. He had seen this remarkably exemplified in the public baths at Rome, which were erected by him, the most entire and the noblest of the ancient buildings. Admiring the extent and fertility of genius of the artists from whose designs such magnificent structures had been executed, he was anxious to see and study any remains that yet existed of those masters whose works were striking monuments of an elegant and improved taste, but whose names, amid the wrecks of time, have sunk into oblivion. It was with this view that he undertook a voyage to Spalatro, in Dalmatia, to visit and examine the private palace of Dioclesian, in which that emperor resided for nine years previous to his death, and to which he retired in the year 305, when he resigned the government of the empire. Mr Adam sailed from Venice in July 1754, accompanied by M. Clerisseau, a French artist and antiquary, and two experienced draughtsmen. On their arrival at Spalatro, they found, that though the palace had suffered much from the injuries of time, yet it had sustained no less from the dilapidations of the inhabitants to procure materials for building; and even the foundations of the ancient structure were covered with modern houses. With high expectations of success they commenced their labours, but were soon interrupted by the jealous vigilance of the government. Suspecting that their object was to view and make plans of the fortifications, an immediate and peremptory order was issued by the governor, commanding them to desist. This order, however, was soon counteracted through the mediation of General Græme, the commander-in-chief of the Venetian forces; and they were permitted to proceed in their undertaking. They resumed their labours with double ardour, and in five weeks finished plans and views of the fragments which remain, from which they were enabled to execute perfect designs of the entire building.

Mr Adam now returned to England, and soon rose to very considerable professional eminence. In 1762 he was appointed architect to the king; and the year following he presented to the public the fruit of his voyage to Spalatro, in a splendid work, containing engravings and descriptions of the ruins of the palace. "For the account of Dioclesian's palace," says Mr Gibbon, "we are indebted to an ingenious artist of our own time and country, whom a very liberal curiosity had carried into the heart of Dalmatia. But there is room to suspect that the elegance of his designs and engravings has somewhat flattered the objects which it was their purpose to represent. We are informed by a more recent and very judicious traveller, the Abbé Fortis, that the awful ruins of Spalatro are not less expressive of the decline of the arts than of the greatness of the Roman empire in the time of Dioclesian." Upon this we may observe, that Mr Adam allows, that previously to this period of the Roman empire the arts had visibly declined; and only contends, that the buildings erected in the reign of Dioclesian exhibit convincing proofs of the style and manner of a purer age.

In the year 1768, Mr Adam obtained a seat in parliament. He was chosen to represent the county of Kinross; and about the same time he resigned his office of architect to the king. But he continued his professional career with increasing reputation; and about the year 1773, in conjunction with his brother James, who also rose to considerable eminence as an architect, he published another splendid work, consisting of plans and elevations of public and private buildings which were erected from their designs. Among these are, Lord Mansfield's house at Caenwood; Luton-house in Bedfordshire, belonging to Lord Bute; the new Gateway of the Admiralty Office; the Register Office at Edinburgh, &c.; which are universally admired as precious monuments of elegant design and correct taste. The Adelphi buildings at London, which are also striking examples of the inventive genius of the Messrs Adam, proved an unsuccessful speculation. The wealth and power of a nation only were equal to so extensive an undertaking; it was too great to be attempted by private citizens.

The buildings more lately erected from the designs of Mr Adam afford additional proofs of his invention and skill. We may mention in particular the Infirmary of Glasgow, as exhibiting the most perfect symmetry and useful disposition of parts, combined with great beauty and lightness.

To the last period of his life Mr Adam displayed an increasing vigour of genius and refinement of taste; for, in the space of one year preceding his death, he designed eight great public works, besides twenty-five private buildings, so various in their style and beautiful in their composition, that they have been allowed, by the best judges, sufficient of themselves to establish his fame. The improved taste which now pretty generally prevails in our public and private edifices, undoubtedly owes much to the elegant and correct style introduced by this distinguished artist.

He died on the 3d of March 1792, by the bursting of a blood-vessel, in the 64th year of his age, and was buried in Westminster Abbey. The natural suavity of his manners, joined to the excellence of his moral character, secured to him the affectionate regard of his friends, and the esteem of all who enjoyed his acquaintance. James Adam, already mentioned as associated with his brother in many of his labours, died on the 20th October 1794.

Adam's Apple, a name given to a species of Citrus.

Adam's Bridge, or *Rama's Bridge*, in *Geography*, a ridge of sands and rocks, extending across the north end of Manara gulf, from the island of that name on the northwest coast of Ceylon, to Ramencote or Ramankoil island, off Raman point.

Adam's Peak, a high mountain in the island of Ceylon, on the top of which, it has been said, the first man was created. It is in the form of a sugar loaf, and terminates in a circular plain about 200 paces in diameter. The summit is covered with trees, and has a deep lake which supplies the principal rivers of the island. The mountain is seen at the distance of twenty leagues from sea. It is situated in Long. 80. 39. E. Lat. 5. 55. N.

ADAMANT, a name sometimes given to the diamond. (See Diamond.) It is likewise applied to the scoriæ of gold, the magnet, &c.

ADAMIC Earth, a name given to common red clay, alluding to that species of earth of which the first man is supposed to have been made.

ADAMI Pomum, in *Anatomy*, a protuberance in the fore part of the throat, formed by the os hyoides. It is thought to be so called from a strange conceit, that a piece of the forbidden apple which Adam ate stuck by the way and occasioned it.

ADAMITES, or Adamians, in *Ecclesiastical History*, the name of a sect of ancient heretics, supposed to have been a branch of the Basilidians and Carpocratians.

Epiphanius tells us that they were called Adamites from their pretending to be re-established in the state of innocence, and to be such as Adam was at the moment of his creation, whence they ought to imitate him in his nakedness.

They rejected marriage, maintaining that the conjugal union would never have taken place upon earth had sin been unknown.

This obscure and ridiculous sect did not at first last long; but it was revived, with additional absurdities, in the twelfth century, by one Tandamus, since known by the name of *Tanchelin*, who propagated his errors at Antwerp in the reign of the emperor Henry V. He maintained that there ought to be no distinction between priests and laymen, and that fornication and adultery were meritorious actions. Tanchelin had a great number of followers, and was constantly attended by 3000 of these profligates in arms. His sect did not, however, continue long after his death; but another appeared under the name of *Turlupins*, in Savoy and Dauphiny, where they committed the most brutal actions in open day.

About the beginning of the fifteenth century, one Picard, a native of Flanders, spread these errors in Germany and Bohemia, particularly in the army of the famous Zisca, notwithstanding the severe discipline he maintained. Picard pretended that he was sent into the world as a new Adam, to re-establish the law of nature; and which, according to him, consisted in exposing every part of the body, and having all the women in common. This sect found also some partisans in Poland, Holland, and England: they assembled in the night; and it is asserted, that one of the fundamental maxims of their society was contained in the following verse:

Jura, perjura, secretum prodere noli.

ADAMS, a township of Berkshire county, in the state of Massachusetts, in North America. It is 140 miles north-west of Boston, and contains 2040 inhabitants. In the northern part of this district, a stream called Hudson's brook has worn a channel through a stratum of white marble, and over the channel the rocks form a fine natural bridge, which is 12 or 15 feet long, 10 feet broad, and more than 60 feet above the water.

Adams, *John*, a distinguished statesman of the United States of North America. He was born on the 19th or (new style) 30th of October 1736, in that part of the township of Braintree, in Massachusetts, which on a subsequent division was called Quincey. His parents were of that class, then abounding in New England, who united the profession of agriculture with that of some one of the mechanic arts. His ancestor Henry had emigrated from Devonshire in the year 1632, and had established himself at Braintree with six sons, all of whom married: from one descended the subject of this memoir, and from another that Samuel Adams who, with John Hancock, was by name proscribed by an act of the British parliament, for the conspicuous part he acted in the early stages of the opposition to the measures of the mother country. When about 15 years of age, his father proposed to his son John either to follow the family pursuits, and to receive in due time, as his portion, a part of the estate which they had cultivated, or to have the expense of a learned education bestowed upon him, with which, instead of any fortune, he was to make his way in future life. The son chose the latter alternative; and having received some preparatory instruction, was admitted a student at Howard College in the year 1751. After passing about three years in that seminary, he removed to the town of Worcester, where, according to the economical practice of that day in New England, he became a tutor in a grammar school, and at the same time was initiated into the practice of the law in the office of Mr Putnam, then an attorney and a colonel of militia, and subsequently a general of some celebrity in the revolutionary war. A letter of Mr Adams, which has lately come before the public, written at the early age of 19, shows a degree of forecast which, like many other productions, may have led to its own accomplishment. It is dated 12th October 1755, and says, "Soon after the Reformation, a few people came over to this new world for conscience' sake. Perhaps this apparently trivial incident may transfer the great seat of empire to America. It looks likely to me; for if we can remove the turbulent Gallic (the French in Canada), our people, according to the exactest computation, will in another century become more numerous than England itself. Should this be the case, since we have, I may say, all the naval stores of the nation in our hands, it will be easy to obtain the mastery of the seas; and then the united force of all Europe will not be able to subdue us. The only way to keep us from setting up for ourselves is to disunite us."

He was admitted to practice in the year 1758, and gradually rose to the degree of eminence which a local court can confer; and obtained distinction by some essays on the subject of the canon and feudal law, which were directed to point to the rising difference which commenced between the mother country and the colonies, soon after the peace of 1763 had delivered the latter from all disquietude respecting the establishments of France in the adjoining province of Canada. His character rose, both as a lawyer and a patriot, so as to induce Governor Barnard, who wished to gain him over to the royal party, to offer him the office of advocate-general in the Admiralty Court, which was deemed a sure step to the highest honours of the bench. Two years after, he was chosen one of the representatives of his native town to the congress of the province.

His professional integrity was soon after exhibited in the defence of Captain Preston and some soldiers, who were tried before a Boston jury on a charge of murder. In this case Adams was counsel for the defence; and being considered by the people, then in an inflamed state against the troops, as a determined friend of liberty, his eloquence obtained a verdict of acquittal, without lessening his popularity.

When it was determined, in 1774, to assemble a general congress from the several colonies, Mr Adams was one of those solicited for the purpose by the people of Massachusetts. Before departing for Philadelphia to join the congress, he parted with the friend of his youth, his fellow-student and associate at the bar, Jonathan Sewall, who had attained the rank of attorney-general, and was necessarily opposed to his political views. Sewall made a powerful effort to change his determination, and to deter him from going to the congress. He urged, that Britain was determined on her system, and was irresistible; and would be destructive to him and all those who should persevere in opposition to her designs. To this Adams replied: "I know that Great Britain has determined on her system, and that very fact determines me on mine. You know I have been constant and uniform in opposition to her measures; the die is now cast; I have passed the Rubicon; to swim or sink, live or die, survive or perish with my country, is my unalterable determination." The conversation was then terminated by Adams saying to his friend, "I see we must part; and with a bleeding heart, I say, I fear for ever. But you may depend upon it, this adieu is the sharpest thorn on which I ever set my foot."

When the continental congress was assembled, Mr Adams became one of its most active and energetic leaders. He was a member of that committee which framed the declaration of independence, and one of the most powerful advocates for its adoption by the general body;

and by his eloquence obtained the unanimous suffrages of that assembly. Though he was appointed chief justice in 1776, he declined the office, in order to dedicate his talents to the general purpose of the defence of the country.

In 1777, he, with three other members, was appointed a commissioner to France. He remained in Paris about a year and a half, when, in consequence of disagreements among themselves, in which Adams was not implicated, all but Franklin were recalled. In the latter end of 1779, he was charged with two commissions, one as a plenipotentiary to treat for peace, the other empowering him to form a commercial treaty with Great Britain. When arrived in Paris, the French government viewed with jealousy the purpose of the second commission; and Count de Vergennes advised him to keep it secret, with a view to prevail on the congress to revoke it. Mr Adams refused to communicate to the Count his instructions on that subject; and an altercation arose, from a claim made by France for a discrimination in favour of French holders of American paper money in the liquidation of it. The Count complained to congress, transmitted copies of Mr Adams' letters, and instructed the French minister at Philadelphia to demand his recall. The demand was rejected, but afterwards four others were joined with him in the commission. Whilst these negotiations were in progress, he went to Holland, and there, in opposition to the influence and talents of the British minister, Sir Joseph Yorke, succeeded both in negotiating a loan, and in procuring the assistance of that country in the defence against Great Britain. He formed a commercial treaty with that republic, and joined in the ephemeral association called "the armed neutrality."

In 1785 Mr Adams was appointed ambassador to the court of his former sovereign, where his conduct was such as to secure the approbation of his own country, and the respect of that to which he was commissioned. Whilst in London, he published his work entitled *Defence of the American Constitution*, in which he combated ably the opinions of Turgot, Mably, and Price, in favour of a single legislative assembly; and thus perhaps contributed to the division of power and the checks on its exercise, which became established in the United States. At the close of 1787 he returned, after ten years devoted to the public service, to America. He received the thanks of congress, and was elected soon after, under the presidency of Washington, to the office of vice-president. In 1790 Mr Adams gave to the public his *Discourses* on Davila, in which he exposed the revolutionary doctrines propagated by France and her emissaries in other countries. On the retirement of Washington, the choice of president fell on Mr Adams, who entered on that office in May 1797. At that time the government was entangled by the insolent pretensions of the French demagogues, and by their partisans in many of the states. Great differences of opinion arose between the individuals at the head of affairs: one party, with Mr Hamilton at their head, was disposed to resist the pretensions of France by open hostilities; whilst Mr Adams was disinclined to war, so long as there was a possibility of avoiding it with honour. Owing to this division of his own friends, rather than to a want of public confidence, at the conclusion of the four years for which the president is chosen, Mr Adams was not re-elected. Perhaps this was in some measure owing to the preponderance of the slave states, in which Mr Jefferson, his rival, and a proprietor of slaves, had a fellow-feeling among the chief of the people.

He retired with dignity at 68 years of age to his native place, formed no political factions against those in power, but publicly expressed his approbation of the measures which were pursued by him who had been his rival, who had become his successor in power, but had never ceased to be his firmly attached friend.

The last public occasion on which Mr Adams appeared, was as a member of the convention for the revision of the constitution of Massachusetts, in which some slight alterations were requisite, in consequence of the province of Maine being separated from it.

He seems to have enjoyed his mental faculties to the close of his protracted life; and even on the last day of it, two hours only before its final close, on the 4th July 1825, the fiftieth anniversary of the act of independence, he dictated to a friend, as a sentiment to be given at the public dinner of the day, "Independence for ever."

Mr Adams was considered as a sound scholar, well versed in the ancient languages, and in many branches of general literature. His style in writing was forcible and perspicuous, and, in the latter years of his life, remarkably elegant. In person he was of middling stature; his manners spoke the courtesy of the old school; and his address, at least when he was in England, was dignified and manly. (G.)

ADAMSHIDE, a district of the circle of Rastenburg, belonging to the king of Prussia, which, with Dombrosken, was bought, in 1737, for 42,000 dollars.

ADAMSON, Patrick, a Scottish prelate, archbishop of St Andrews, was born in the year 1543 in the town of Perth, where he received the rudiments of his education; and afterwards studied philosophy, and took his degree of master of arts, at the university of St Andrews. In 1566 he set out for Paris as tutor to a young gentleman. In the month of June of the same year, Mary Queen of Scots being delivered of a son, afterwards James VI. of Scotland and I. of England, Mr Adamson wrote a Latin poem on the occasion. In this poem he gave the prince the title of king of France and England; and this proof of his loyalty involved him in difficulties, for the French court was offended, and ordered him to be arrested; and he was confined for six months. He was released only through the intercession of Queen Mary and some of the principal nobility, who interested themselves in his behalf. As soon as he recovered his liberty, he retired with his pupil to Bourges. He was in this city during the massacre at Paris; and the same persecuting spirit prevailing among the Catholics at Bourges as at the metropolis, he lived concealed for seven months in a public house, the master of which, upwards of 70 years of age, was thrown from its top and had his brains dashed out, for his charity to heretics. Whilst Mr Adamson lay thus in his sepulchre, as he called it, he wrote his Latin poetical version of the book of Job, and his tragedy of Herod in the same language. In the year 1573, he returned to Scotland, and, having entered into holy orders, became minister of Paisley. In the year 1575, he was appointed one of the commissioners, by the general assembly, to settle the jurisdiction and policy of the church; and the following year he was named, with Mr David Lindsay, to report their proceedings to the earl of Morton, then regent. About this time the earl appointed him one of his chaplains; and, on the death of Bishop Douglas, promoted him to the archiepiscopal see of St Andrews, a dignity which brought upon him great trouble and uneasiness; for now the clamour of the Presbyterian party rose very high against him, and many inconsistent absurd stories were propagated concerning him. Soon after his promotion, he published his catechism in Latin verse, a work highly approved even by his enemies; but, nevertheless, they still continued to persecute him with great violence. In 1578 he submitted himself to the general assembly, which procured him peace but for a very little time; for, the year following, fresh accusations were brought against him. In the year 1582, being attacked with a grievous disease, in which the physicians could give him no relief, he happened to take a simple medicine from an old woman, which did him service. The woman, whose name was Alison Pearson, was thereupon charged with witchcraft, and committed to prison, but escaped out of her confinement; however, about four years afterwards, she was again found and burnt for a witch. In 1583 King James came to St Andrews; and the archbishop, being much recovered, preached before him, and disputed with Mr Andrew Melville, in presence of his Majesty, with great reputation; which drew upon him fresh calumny and persecution. The king, however, was so well pleased with him, that he sent him ambassador to Queen Elizabeth, at whose court he resided for some years. His conduct during his embassy has been variously reported by different authors. Two things he principally laboured, viz. the recommending the king his master to the nobility and gentry of England, and the procuring some support for the episcopal party in Scotland. His eloquent preaching drew after him such crowds of people, and raised in their minds so high an idea of the young king his master, that Queen Elizabeth forbade him to enter the pulpit during his stay in her dominions. In 1584 he was recalled, and sat in the parliament held in August at Edinburgh. The Presbyterian party was still very violent against the archbishop. A provincial synod was held at St Andrews in April 1586: the archbishop was here accused and excommunicated. He appealed to the king and the states, but this availed him little; for the mob being excited against him, he durst scarcely appear in public. At the next general assembly, a paper being produced containing the archbishop's submission, he was absolved from the excommunication. In 1588 fresh accusations were brought against him. The year following he published the Lamentations of the prophet Jeremiah in Latin verse, which he dedicated to the king, complaining of his hard usage. In the latter end of the same year he published a translation of the Apocalypse in Latin verse, and a copy of Latin verses, addressed also to his Majesty, deploring his distress. The king, however, was not moved by his application, for the revenue of his see was granted to the duke of Lennox; so that the prelate and his family were literally reduced to the want of bread. During the remaining part of his unfortunate life he was supported by charitable contribution, and he died in 1591. The character of this prelate has been variously represented, according to the sentiments of religion and politics which prevailed. But there is little doubt that he encouraged and supported, under the authority of the king, oppressive and injurious measures. His learning was unquestioned, and he acquired great reputation as a popular preacher. In his adversity he submitted with pious resignation to his hard fate. The panegyric of the editor of his works, Mr Wilson, is extravagant and absurd. He says, that "he was a miracle of nature, and rather seemed to be the immediate production of God Almighty, than born of a woman."

ADAMUS. The philosopher's stone is so called by alchemists: they say it is an animal, and that it has carried its invisible *Eve* in its body since the moment they were united by the Creator.

ADANA, a town of Asia Minor, in Natolia, and in the province of Caramania. It is situated on the river Choquen, on the banks of which stands a small but strong castle, built on a rock. It has a great number of beautiful fountains brought from the river by means of water-works. Over the river there is a stately bridge of fifteen arches, which leads to the water-works. The climate is pleasant and healthy, and the winter mild and serene; but the summer is so hot as to oblige the principal inhabitants to retire to the neighbouring mountains, where they spend six months among shady trees and grottos, in a most delicious manner. The adjacent country is rich and fertile, and produces melons, cucumbers, pomegranates, pulse, and herbs of all sorts, all the year round; besides corn, wine, and fruits in their proper season. It is 30 miles north-east of Tarsus, on the road to Aleppo. Long. 36. 12. E. Lat. 38. 10. N.

ADANSON, Michael, a celebrated naturalist, was descended from a Scotish family which had at the Revolution attached itself to the fortunes of the house of Stuart; and was born the 7th of April 1727 at Aix in Provence, where his father was in the service of M. de Vintimille, then archbishop of that province. On the translation of this prelate to the archbishopric of Paris, about the year 1730, the elder Adanson also repaired thither, accompanied by his infant family of five children, all of whom were provided for by their father's patron. A small canonry fell to the lot of our future naturalist, the revenue of which defrayed the expenses of his education at the college of Plessis. While there, he was distinguished for great quickness of apprehension, strength of memory, and mental ardour; but his genius took no particular bent, until he received a microscope from the celebrated Tuberville Needham, who happened to be present at one of the public examinations, and was struck with admiration of his talents and acquirements. From the moment that young Adanson received this donation, to the last hour of his life, he persevered, with a zeal almost unexampled, in the observation and study of nature.

On leaving college, his youthful ardour was well employed in the cabinets of Reaumur and Bernard de Jussieu, as well as in the *Jardin des Plantes*. Such was his zeal, that he repeated the instructions of the professors to such of his fellow-students as could not advance with a rapidity equal to his own; and before he had completed his 19th year, he had actually described (for his own improvement) four thousand species of the three kingdoms of nature. In this way he soon exhausted the rich stores of accumulated knowledge in Europe; and having obtained a small appointment in the colony of Senegal, he resigned his canonry, and embarked on the 20th of December 1748 for Africa.

The motives which decided the choice of Senegal as the scene of his observations are recorded by himself, and are too remarkably indicative of his ardent thirst of knowledge not to be noticed. "It was," says he, in a memorandum found after his death, "of all European establishments the most difficult to penetrate, the most hot, the most unhealthy, the most dangerous in every respect, and consequently the least known to naturalists."

His ardour remained unabated during the five years that he remained in Africa, in which period he collected and described an immense number of animals and plants; delineated maps of the country, and made astronomical observations; prepared grammars and dictionaries of the languages spoken on the banks of the Senegal; kept meteorological registers; composed a detailed account of all the plants of the country; and collected specimens of every object of commerce. M. Cuvier mentions that he had seen the produce and results of all these multifarious and laborious exertions.

The situation in which Adanson was placed was admirably adapted to foster originality of genius; but it was also attended with every disadvantage that can arise from a want of comparison and rivalry. The collision of kindred intellects generally diminishes an overweening conceit; whilst entire seclusion from literary society as generally increases the presumption of genius, and renders errors familiar by long uncorrected repetition. To these causes, and to the secluded life which he continued to lead even after his return to Europe, may probably be traced some of the peculiar features of Adanson's character. Thus, he chose to distinguish himself by a new system of orthography; and, instead of a simple and convenient nomenclature, he employed a set of arbitrary terms, whose etymology could not be traced, and the synonymes to which he rarely condescended to point out. He was opinionative in no small degree; and his vanity and self-confidence too often led him to overlook or to undervalue the labours of those who were engaged in the same field of inquiry.

About the period of Adanson's return to Europe, which took place in 1754, natural history had undergone a very important revolution, from the valuable though widely differing labours of Buffon and Linnæus. The one, giving loose to his imagination, pursued a path as seductive as beautiful; the other, entering with minute discrimination into every department, furnished a text-book to philosophers, leaving the splendid paintings of his eloquent rival to those who delight rather in brilliancy of colouring than in the chaste portraiture of nature. Both of these distinguished men, from too closely confining themselves to their individual views, appear to have in a great measure overlooked a most interesting branch of their subject, viz. the general relations of all beings, from which is deduced the division of them into families; which division is founded on their peculiar characters. This had formed an important branch of Adanson's solitary reflections; and the boldness with which he developed his views soon attracted the admiration of naturalists. To appreciate thoroughly the value of his labours, it will be necessary to exhibit a rapid sketch of the general principles which influence *natural* arrangements, and the particular views entertained by Adanson.

Every organized being is to be considered as an assemblage of parts, which by reciprocal actions produce certain effects. Between all of these parts a mutual dependence subsists, and no modification can be effected in any one member of the series, without sensibly affecting all the others in a greater or less degree. It is obvious that there can only be a certain number of possible combinations, which may be divided into two great classes, the primary and the subordinate.

The first step towards the knowledge of these combinations would be an accurate acquaintance with all the actually existing organs. If this were attained, and if a complete view of all possible combinations were deduced, every organized being would be allotted to a determinate place, according to its organs; and there would be a correct systematic arrangement of all organic nature; every relation, every property, would be reducible to general laws; every function might be demonstrated; and natural history would become a precise science. Such, however, is only the ideal perfection at which we aim in attempting natural methods, to which we cannot expect the rapid advance fancied by some visionary theorists, but to which a steady perseverance, unclouded by preconceived prejudices, will ultimately enable us to approach.

The most direct means of calculating the effects of the before-mentioned modifications would be, to determine the function and the influence of each organ. In this way, the great divisions might be made according to the most important organs, and the inferior would be naturally founded on the relations of the less important organs. A scale would thus be established, not less correct as regarding the order of nature, than if it had been formed subsequently to a full examination of all her works. This principle of classification has been named by some philosophers *the subordination of characters*. It is rational and philosophical, but its application presupposes an advancement in science far beyond that which existed at the period when Adanson commenced his labours. Accordingly, he adopted a more experimental method—that of a complete comparison of species; and the mode of applying his scheme is abundantly ingenious, and entirely his own.

He founded his classification of all known organized beings on the consideration of each individual organ. As each organ gave birth to new relations, so he established a corresponding number of arbitrary arrangements. Those beings possessing the greatest number of similar organs were referred to one great division, and the relationship was considered more remote in proportion to the dissimilarity of organs.

The chief defect of this method consists in presupposing a knowledge, not less difficult of attainment than the former, of species and their organization. It gives, however, distinct ideas of the degree of affinity subsisting between organized beings, independent of all physiological science. Of this *universal method*, as he called it, Adanson gave some account in an essay contained in his Treatise on Shells, published at the end of his *Voyage au Sénégal*.

Until the appearance of this work, the animals inhabiting shells had been much neglected. On this branch of his subject our author exercised his wonted zeal, while his methodical distribution, founded on not less than twenty of the partial classifications already alluded to, is decidedly superior to that of any of his predecessors. Like every first attempt, however, it had its imperfections, and these arose from not having examined the anatomical structure of the animals; from which cause he omitted, in his arrangement of the class of *Mollusca*, all *molluscous* animals without shells.

His original plan was to have published the whole of the observations made during his residence at Senegal, in eight volumes; but being deterred by the difficulties attending so extensive a publication, he abandoned the scheme, and applied himself entirely to his *Families of Plants*, which he published in 1763. In this he found the application of his general principle not less advantageous than in his preceding works.

The distribution of plants into *natural* families has attracted the notice of botanists since the middle of the seventeenth century. Bernard de Jussieu, the friend and instructor of Adanson, bestowed much attention on this subject; but, dissatisfied with his success, has left no other memorial of his labours than the arrangement which he introduced in the gardens of Trianon in 1758. Prompted by his own bold genius, as well as by the example of so distinguished a friend, Adanson undertook the task; and although he fell into errors which had been avoided by Jussieu, he executed it, upon the whole, with consummate ability. In the preface to this work he gave an elaborate account of the history of botany; and here it is not difficult to perceive, that one of his chief objects was to insinuate his own claims to be placed at the head of scientific botanists.

In 1774 (eleven years after the appearance of his *Families of Plants*), he submitted to the consideration of the Academy of Sciences an immense work, containing what may be called the *universal application of his universal method*; for it extended to all known beings and substances, whether in the heavens or on the earth. Twenty-seven large volumes of manuscripts were employed in displaying the general relations of all these matters, and their distribution. One hundred and fifty volumes more were occupied with the alphabetical arrangement of 40,000 species. There was also a vocabulary, which contained 200,000 words, with their explanations; and the whole was closed by a number of detached memoirs, 40,000 figures, and 30,000 specimens of the three kingdoms of nature. The committee of the academy, to which the inspection of this enormous mass had been intrusted, warmly recommended to Adanson to separate and publish all that was peculiarly his own, leaving out what was merely compilation: but he obstinately rejected this reasonable advice; by which means science has been deprived of many essays, which, if we may judge from others which he at different times gave to the world, would have possessed great merit.

In the midst of his scientific ardour, Adanson devoted much of his attention to a subject on which his feelings had probably been powerfully awakened during his residence in Senegal:—we need scarcely name the slave trade. Anxious to contribute to the comforts of Europe, as well as to the security of Africa, he addressed a memoir to the minister, in which he attempted to demonstrate that Senegal was well fitted for the production of all the valuable produce of the West Indian Archipelago, and that by suitable encouragement free negroes might be induced to engage in the cultivation of the soil. This proposition received no encouragement either from the minister or the French African Company; and as his mistaken notions of patriotism led him to reject all overtures from the friends of the abolition in England, the details of his plan still remain unknown to the world.

Of Adanson's public life little further remains to be said; for after his rejection of the proffered counsel of the academicians, he seems to have pursued his philosophic career in silent and unobtrusive retirement. Engaged in such occupations, it might have been supposed that he would have been exempted from the evils of that terrible revolution which has been productive of so many calamities to his country and to Europe. But the case was very different. As he had devoted his life to science for its own sake, he had never made it the means of acquiring wealth; and having no patrimony from his ancestors, his only fortune consisted of pensions, the reward of his labours in Senegal, and the price of the specimens furnished by him to the royal cabinet. With an injustice and illiberality distinctive of revolutionary Frenchmen, the Constituent Assembly deprived this harmless man, who was known only as an ornament to science, of what he had so hardly earned. A trifling pension from the academy still remained, and was sufficient for his limited wants; but on the dissolution of that respectable body by the fanatical republicans, this his last resource was also annihilated. When the revolutionary frenzy had subsided, and science again received the homage of Frenchmen, the reproachful poverty of this veteran sage was at length relieved from the public funds; and the founders of the Institute were proud to enrol his name in the catalogue of its members. But his life was now drawing near to its close. He died, after many months of severe suffering, on the 3d of August 1806.

Adanson was never married. In his will he requested, as the only decoration of his grave, a garland of flowers gathered from the fifty-eight families which he had established;—"a touching though transitory image," says Cuvier, "of the more durable monument which he has erected to himself in his works." His zeal for science, his unwearied industry, and his talents as a philosophical observer, are conspicuous in all his writings. The serenity of his temper, and the unaffected goodness of his heart, endeared him to the few who knew him intimately. On the other hand, it must be admitted, that, from early habits, he trusted too exclusively to his own talents, and would never deign to examine the discoveries of others; so that he persisted in a thousand times refuted errors, with as much pertinacity as he did in the most unquestionable truths of science. Cuvier relates a remarkable instance of his contempt for every thing that did not fall within the scope of his own observations. Although he had bestowed much care on the subject of *mosses*, yet, in 1800, he was ignorant not only of the discoveries, but even of the very existence, of Hedwig. But though his vanity was great, it was not accompanied with any malignant feelings; and, notwithstanding his misfortunes, he was never heard to accuse any person of having contributed to inflict them.

His most important works are, his *Voyage to Senegal*, and his *Families of Plants*. To the former some essays, already noticed, were subjoined; and various others were published, at different times, in the *Transactions of the Academy of Sciences*. The volumes for the years 1759 and 1761 contain his observations upon the *Taret* (a species of shell-fish exceedingly destructive to vessels), and his account of the *Baobab*, an enormous African tree, now known under the name of *Adansonia*. The volume for 1769 contains an interesting discussion by Adanson, upon the origin of the varieties of cultivated plants; and in those for 1773 and 1779 will be found his valuable observations on gum-bearing trees. In the Transactions of 1767 he gave an account of the *Oscillatoria Adansonii*, which he considered a self-moving vegetable; but which ought, according to some observations of M. Vaucher, to be ranked as a zoophyte. Besides these essays, Adanson contributed several valuable articles in natural history to the earlier part of the Supplement to the first *Encyclopédie*; and he is also supposed to have been the author of an essay on the *Electricity of the Tourmaline* (Paris 1757), which bears the name of the duke of Noya Caraffa. See *Eloge Historique de M. Adanson*, par Cuvier; *Mém. Mathem. et Physiques de l'Inst. National*, tom. vii. (I.)

ADANSONIA, Ethiopian Sour-gourd, Monkeys-bread, or African Calabash-tree.

ADAR, the name of a Hebrew month, answering to the end of February and beginning of March, the 12th of their sacred and 6th of their civil year. On the 7th day of it the Jews keep a fast for the death of Moses; on the 13th they have the feast of Esther; and on the 14th they celebrate the feast of Purim, for their deliverance from Haman's conspiracy. As the lunar year, which the Jews followed in their calculations, is shorter than the solar by about eleven days, which at the end of three years make a month, they then intercalate a thirteenth month, which they call *Veadar*, or the *second Adar*.

ADARCE, a kind of concreted salts found on reeds and other vegetables, and applied by the ancients as a remedy in several cutaneous diseases.

ADARCON, in Jewish antiquity, a gold coin mentioned in Scripture, worth about 15s. sterling.

ADARME, in *Commerce*, a small weight in Spain, which is also used at Buenos Ayres, and in all Spanish America. It is the 16th part of an ounce, which at Paris is called the *demi-gros*. But the Spanish ounce is seven per cent. lighter than that of Paris. Stephens renders it in English by a *drachm*.

ADATAIS, Adatis, or Adatys, in *Commerce*, a muslin or cotton cloth, very fine and clear, of which the piece is ten French ells long, and three quarters broad. It comes from the East Indies, and the finest is made in Bengal.

ADCORDABILES Denarii, in old law-books, signify money paid by the vassal to his lord, upon the selling or exchanging of a feud.

ADCRESCENTES, among the Romans, denoted a kind of soldiery, entered in the army, but not yet put on duty: from these the standing forces were recruited.

ADDA, a river of Switzerland and Italy, which rises in Mount Branlio, in the country of the Grisons, and, passing through the Valteline, traverses the lake Como and the Milanese, and falls into the Po near Cremona.

ADDEPHAGIA, in *Medicine*, a term used by some physicians for gluttony, or a voracious appetite.

ADDER, in *Zoology*, a name for the Viper.

Sea Adder, the English name for a species of Syngnathus.

Water Adder, a name given to the Coluber *Natrix*.

ADDEXTRATORES, in the court of Rome, the pope's mitre-bearers; so called, according to Ducange, because they walk at the pope's right hand when he rides to visit the churches.

ADDICE, or Adze, a kind of crooked axe used by shipwrights, carpenters, coopers, &c.

ADDICTI, in antiquity, a kind of slaves, among the Romans, adjudged to serve some creditor whom they could not otherwise satisfy, and whose slaves they became till they could pay or work out the debt.

ADDICTION, among the Romans, was the making over goods to another, either by sale or by legal sentence: the goods so delivered were called *bona addicta*. Debtors were sometimes delivered over in the same manner, and thence called *servi addicti*.

ADDICTIO in Diem, among the Romans, the adjudging a thing to a person for a certain price, unless by such a day the owner, or some other, give more for it.

ADDISON, Lancelot, son of Lancelot Addison, a clergyman, was born in the parish of Crosby-Ravensworth, in Westmoreland, in the year 1632. He was educated at Queen's College, Oxford, and at the restoration of King Charles II. accepted of the chaplainship of the garrison of Dunkirk; but that fortress being delivered up to the French in 1662, he returned to England, and was soon after made chaplain to the garrison of Tangier, where he continued seven years, and was greatly esteemed. In 1670 he returned to England, and was made chaplain in ordinary to the king; but his chaplainship of Tangier being taken from him on account of his absence, he found himself straitened in his circumstances, when he seasonably obtained the rectory of Milston in Wiltshire, worth about L.120 per annum. He afterwards became a prebendary of Sarum, took his degree of doctor of divinity at Oxford, and in 1683 was made dean of Lichfield, and the next year archdeacon of Coventry. His life was exemplary, his conversation pleasing and greatly instructive, and his behaviour as a gentleman, a clergyman, and a neighbour, did honour to the place of his residence. He wrote, 1. A Short Narrative of the Revolutions of the Kingdoms of Fez and Morocco; 2. The present State of the Jews; 3. A Discourse on Catechising; 4. A Modest Plea for the Clergy; 5. An Introduction to the Sacrament; 6. The first State of Mahometism; and several other pieces. This worthy divine died on the 20th of April 1703, and left three sons; Joseph, the subject of the next article; Gulston, who died while governor of Fort St George; Lancelot, master of arts, and fellow of Magdalen College in Oxford; and one daughter, first married to Dr Sarte, prebendary of Westminster, and afterwards to Daniel Combes, Esq.

Addison, *Joseph*, the son of the preceding Dean Addison, was born at Milston, near Ambresbury, in Wiltshire, on the 11th of May 1672; and not being thought likely to live, was baptized the same day. He received the first rudiments of his education at the place of his nativity under the reverend Mr Naish, but was soon removed to Salisbury under the care of Mr Taylor, and from thence to the Charter-house, where his acquaintance with Sir Richard Steele commenced. About the age of 15, he was entered at Queen's College, Oxford, where he applied very closely to the study of classical learning, in which he made a surprising proficiency.

In the year 1687, Dr Lancaster, dean of Magdalen College, having by chance seen a Latin poem of Mr Addison's, was so pleased with it, that he immediately got him elected into that house, where he took his degrees of bachelor and master of arts. His Latin pieces, in the course of a few years, were exceedingly admired in both universities; nor were they less esteemed abroad, particularly by the celebrated Boileau, who is reported to have said, that he would not have written against Perrault had he before seen such excellent pieces by a modern hand. He published nothing in English before the 22d year of his age, when there appeared a short copy of verses written by him, and addressed to Mr Dryden, which procured him great reputation from the best judges. This was soon followed by a translation of the fourth Georgic of Virgil (omitting the story of Aristæus), much commended by Mr Dryden. He wrote also the Essay on the Georgics prefixed to Mr Dryden's translation. There are several other pieces written by him about this time; amongst the rest, one dated the 3d of April 1694, addressed to H. S. that is, Dr Sacheverel, who became afterwards so famous, and with whom Mr Addison lived once in the greatest friendship; but their intimacy was some time after broken off, by their disagreement in political principles. In the year 1695 he wrote a poem to King William on one of his campaigns, addressed to Sir John Somers, lord-keeper of the great seal. This gentleman received it with great pleasure, took the author into the number of his friends, and bestowed on him many marks of his favour.

Mr Addison had been closely pressed while at the university to enter into holy orders, and had once resolved upon it; but his great modesty, his natural diffidence, and an uncommonly delicate sense of the importance of the sacred function, made him afterwards alter his resolution; and having expressed an inclination to travel, he was encouraged thereto by his patron above mentioned, who by his interest procured him from the crown a pension of L.300 per annum to support him in his travels. He accordingly made a tour to Italy in the year 1699; and in 1701 he wrote a poetical epistle from Italy to the earl of Halifax, which has been much esteemed both abroad and at home. It was translated into Italian verse by the abbot Antonio Maria Salvini, Greek professor at Florence. In the year 1705 he published an account of his travels, dedicated to Lord Somers; which, though at first but indifferently received, yet in a little time met with its deserved applause.

In the year 1702 he was about to return to England, when he received advice of his being appointed to attend Prince Eugene, who then commanded for the emperor in Italy; but the death of King William happening soon after, put an end to this affair, as well as his pension; and he remained for a considerable time unemployed. But an unexpected incident at once raised him, and gave him an opportunity of exerting his fine talents to advantage; for, in the year 1704, the lord treasurer Godolphin happened to complain to Lord Halifax that the duke of Marlborough's victory at Blenheim had not been celebrated in verse in the manner it deserved; and intimated, that he would take it kindly if his lordship, who was the known patron of the poets, would name a gentleman capable of doing justice to so elevated a subject. Lord Halifax replied, somewhat hastily, that he did know such a person, but would not mention him; adding, that long had he seen with indignation men of no merit maintained in luxury at the public expense, whilst those of real worth and modesty were suffered to languish in obscurity. The treasurer answered very coolly, that he was sorry there should be occasion for such an observation, but that he would do his endeavour to wipe off such reproaches for the future; and he engaged his honour, that whoever might be named by his lordship as a person capable of celebrating this victory, should meet with a suitable recompense. Lord Halifax thereupon named Mr Addison; insisting, however, that the treasurer himself should send to him; which he promised. Accordingly he prevailed on Mr Boyle (afterwards Lord Carlton), then chancellor of the exchequer, to make the proposal to Mr Addison; which he did in so polite a manner, that our author readily undertook the task. The lord treasurer had a sight of the piece when it was carried no further than the celebrated simile of the angel, and was so pleased with it, that he immediately appointed Mr Addison a commissioner of appeals, vacant by the promotion of Mr Locke, chosen one of the lords commissioners for trade. The Campaign is addressed to the duke of Marlborough: it gives a short view of the military transactions in 1704, and contains a noble description of the two great actions at Schellemberg and Blenheim. In 1705 he attended Lord Halifax to Hanover, and the ensuing year was appointed under secretary to Sir Charles Hedges, secretary of state, in which office he acquitted himself so well that the earl of Sunderland, who succeeded Sir Charles in December, continued Mr Addison in his employment.

A taste for operas beginning at this time to prevail in England, and many persons having solicited Mr Addison to write one, he complied with their request, and composed his *Rosamond*. This, however, whether from the defect of the music, or from the prejudices in favour of the Italian taste, did not succeed upon the stage; but the poetry of it has been, and always will be, justly admired. About this time Sir Richard Steele composed his comedy of the *Tender Husband*, to which Mr Addison wrote a prologue. Sir Richard surprised him with a dedication of this play, and acquainted the public that he was indebted to him for some of the most excellent strokes in the performance. The marquis of Wharton, being appointed lord lieutenant of Ireland in 1709, took Mr Addison with him as his secretary. Her Majesty also made him keeper of the records of Ireland, and as a further mark of her favour, considerably augmented the salary annexed to that place. Whilst he was in this kingdom, the *Tatler* was first published; and he discovered his friend Sir Richard Steele to be the author, by an observation on Virgil, which he had communicated to him. He afterwards assisted considerably in carrying on this paper, which the author acknowledges. The *Tatler* being laid down, the *Spectator* was set on foot, and Mr Addison furnished great part of the most admired papers. The *Spectator* made its first appearance in March 1711, and was brought to a conclusion in September 1712.

His celebrated *Cato* appeared in 1713. He formed the design of a tragedy upon this subject when he was very young, and wrote it when on his travels: he retouched it in England, without any intention of bringing it on the stage; but his friends being persuaded it would serve the cause of liberty, he was prevailed on by their solicitations, and it was accordingly exhibited in the theatre, with a prologue by Mr Pope, and an epilogue by Dr Garth. It was received with the most uncommon applause, having run 35 nights without interruption. The Whigs applauded every line in which liberty was mentioned, as a satire on the Tories; and the Tories echoed every clap, to show that the satire was unfelt. When it was printed, notice was given that the queen would be pleased if it was dedicated to her; "but as he had designed that compliment elsewhere, he found himself obliged," says Tickell, "by his duty on the one hand, and his honour on the other, to send it into the world without any dedication." It was no less esteemed abroad, having been translated into French, Italian, and German; and it was acted at Leghorn and several other places with vast applause. The Jesuits of St Omer made a Latin version of it, and the students acted it with great magnificence.

About this time another paper called the *Guardian* was published by Steele, to which Addison was a principal contributor. It was a continuation of the *Spectator*, and was distinguished by the same elegance and the same variety; but, in consequence of Steele's propensity to politics, was abruptly discontinued in order to write the *Englishman*.

The papers of Addison are marked in the *Spectator* by one of the letters in the name of *Clio*, and in the Guardian by a *Hand*. Many of these papers were written with powers truly comic, with nice discrimination of characters, and accurate observation of natural or accidental deviations from propriety; but it was not supposed that he had tried a comedy for the stage, till Steele, after his death, declared him the author of the *Drummer*. This, however, he did not know to be true by any cogent testimony; for when Addison put the play into his hands, he only told him it was the work of a gentleman in the company: when it was received, as is confessed, with cold disapprobation, he was probably less willing to claim it. Tickell omitted it in his collection; but the testimony of Steele, and the total silence of any other claimant, has determined the public to assign it to Addison, and it is now printed with his other poetry. Steele carried the *Drummer* to the playhouse, and afterwards to the press, and sold the copy for 50 guineas. To Steele's opinion may be added the proof supplied by the play itself, of which the characters are such as Addison would have delineated, and the tendency such as Addison would have promoted.

It is said that Mr Addison intended to compose an English dictionary, upon the plan of the Italian *Della Crusca*; but that upon the death of the queen, being appointed secretary to the lords justices, he had not leisure to carry on such a work. When the earl of Sunderland was appointed lord-lieutenant of Ireland, Mr Addison was again made secretary for the affairs of that kingdom; and upon the earl's being removed from the lieutenancy, he was chosen one of the lords of trade.

Not long afterwards an attempt was made to revive the *Spectator*, at a time indeed by no means favourable to literature, when the accession of a new family to the throne filled the nation with anxiety, discord, and confusion; and either the turbulence of the times or the satiety of the readers put a stop to the publication, after an experiment of 80 numbers, which were afterwards collected into an eighth volume, perhaps more valuable than any of those that went before it: Addison produced more than a fourth part.

In 1715 he began the *Freeholder*, a political paper, which was much admired, and proved of great use at that juncture. He published also, about this time, verses to Sir Godfrey Kneller upon the king's picture, and some to the princess of Wales with the tragedy of Cato.

Before the arrival of King George he was made secretary to the regency, and was required by his office to send notice to Hanover that the queen was dead, and that the throne was vacant. To do this would not have been difficult to any man but Addison, who was so overwhelmed with the greatness of the event, and so distracted by choice of expression, that the lords, who could not wait for the niceties of criticism, called Mr Southwell, a clerk in the house, and ordered him to dispatch the message. Southwell readily told what was necessary, in the common style of business, and valued himself upon having done what was too hard for Addison.

In 1716 he married the countess dowager of Warwick, whom he had solicited by a very long and anxious courtship. He is said to have first known her by becoming tutor to her son. The marriage, if uncontradicted report can be credited, made no addition to his happiness. The year after, 1717, he rose to his highest elevation, being made secretary of state; but is represented as having proved unequal to the duties of his place. In the House of Commons he could not speak, and therefore was useless to the defence of the government. In the office he could not issue an order without losing time in quest of fine expressions. At last, finding by experience his own inability for public business, he was forced to solicit his dismission, with a pension of L.1500 a year. Such was the account of those who were inclined to detract from his abilities; but by others his relinquishment was attributed to declining health, and the necessity of recess and quiet.

In his retirement he applied himself to a religious work,[1] which he had begun long before; part of which, scarce finished, has been printed in his works. He intended also to give an English paraphrase of some of David's psalms; but his ailments increased, and cut short his designs. He had for some time been oppressed by an asthmatic disorder, which was now aggravated by a dropsy, and he prepared to die conformably to his precepts and professions. He sent, as Pope relates, a message by the earl of Warwick to Mr Gay, desiring to see him. Gay, who had not visited him for some time before, obeyed the summons, and was received with great kindness. The purpose for which the interview had been solicited was then discovered: Addison told him that he had injured him, but that if he recovered he would recompense him. What the injury was he did not explain, nor did Gay ever know; but supposed that some preferment designed for him had by Addison's intervention been withheld. Another death-bed interview, of a more solemn nature, is recorded. Lord Warwick was a young man of very irregular life, and perhaps of loose opinions: Addison, for whom he did not want respect, had very diligently endeavoured to reclaim him; but his arguments and expostulations had no effect. One experiment, however, remained to be tried. When he found his life near its end, he directed the young lord to be called; and when he desired, with great tenderness, to hear his last injunctions, told him, "I have sent for you that you may see how a Christian can die." What effect this awful scene had on the earl's behaviour is not known: he died himself in a short time. Having given directions to Mr Tickell for the publication of his works, and dedicated them on his death-bed to his friend Mr Craggs, he died June 17. 1719, at Holland-house, leaving only one child, a daughter, by his marriage.

Addison's course of life before his marriage has been detailed by Pope. His chief companions were Steele, Bugdell, Philips, Carey, Davenant, and Colonel Brett. With one or other of these he always breakfasted. He studied all morning; then dined at a tavern, and went afterwards to Button's. From the coffee-house he went to the tavern, where he often sat late and drank too much wine.

Dr Johnson justly observes, that Addison "not only made the proper use of wit himself, but taught it to others; and from his time it has been generally subservient to the cause of reason and of truth. He has dissipated the prejudice that had long connected gaiety with vice, and easiness of manners with laxity of principles. He has restored virtue to its dignity, and taught innocence not to be ashamed. This is an elevation of literary character, *above all Greek, above all Roman fame.* No greater felicity can genius attain, than that of having purified intellectual pleasure, separated mirth from indecency, and wit from licentiousness; of having taught a succession of writers to bring elegance and gaiety to the aid of goodness; and, to use expressions yet more awful, of having *turned many to righteousness.*"—"As a describer of life and manners," says the same author, "he must be allowed to stand perhaps the first of the first rank. His humour, which, as Steele observes, is peculiar to himself, is so happily diffused as to give the grace of novelty to domestic scenes and daily occurrences. He never *outsteps the modesty of nature*, nor raises merriment or wonder by the violation of truth. His figures neither divert by distortion nor amaze by aggravation. He copies life with so much fidelity, that he can hardly be said to invent; yet his exhibitions have an air so much original, that it is difficult to suppose them not merely the product of imagination. As a teacher of wisdom he may be confidently followed. His religion has nothing in it enthusiastic or superstitious; he appears neither weakly credulous nor wantonly sceptical; his morality is neither dangerously lax nor impracticably rigid. All the enchantment of fancy and all the cogency of argument are employed to recommend to the reader his real interest, the care of pleasing the Author of his being. Truth is shown sometimes as the phantom of a vision, sometimes appears half-veiled in an allegory; sometimes attracts regard in the robes of fancy, and sometimes steps forth in the confidence of reason. She wears a thousand dresses, and in all is pleasing.

"His prose is the model of the middle style; on grave subjects not formal, on light occasions not grovelling; pure without scrupulosity, and exact without apparent elaboration; always equable, and always easy, without glowing words or pointed sentences. Whoever wishes to attain an English style, familiar but not coarse, and elegant but not ostentatious, must give his days and nights to the volumes of Addison." (Johnson's *Lives of the Poets.*)

Dr Johnson has related the following anecdote, which every admirer of Addison, every man of feeling, must be reluctant to believe. "Steele," says the doctor, "whose imprudence of generosity or vanity of profusion kept him always incurably necessitous, upon some pressing exigence, in an evil hour, borrowed a hundred pounds of his friend, probably without much purpose of repayment; but Addison, who seems to have had other notions of a hundred pounds, grew impatient of delay, and reclaimed his loan by an execution. Steele felt, with great sensibility, the obduracy of his creditor; but with emotions of sorrow rather than of anger." It is much to be wished, says Dr Kippis, that Dr Johnson had produced his authority for this narration. It is very possible that it may be only a story the doctor had somewhere heard in conversation, and which is entirely groundless; "and this I am the rather inclined to believe, as I have been assured, by one of the most respectable characters in the kingdom, that the fact hath no foundation in truth." Mr Potter, in a late publication, hath informed us, that he is told by the best authority that the story is an absolute falsehood.

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[1] *Evidences of the Christian Religion.*

Mr Tyers, in *A Historical Essay on Mr Addison*, printed, but not published, has mentioned some facts concerning him, with which we were not before acquainted. These are, that he was laid out for dead as soon as he was born; that when he addressed his verses on the English poets to Henry Sacheverel, he courted that gentleman's sister; that whenever Jacob Tonson came to him for the Spectator, Bayle's French Historical and Critical Dictionary lay always open before him; that upon his return to England, after his travels, he discharged some old debts he had contracted at Oxford, with the generosity of good interest; that he was put into plentiful circumstances by the death of a brother in the East Indies; that, having received encouragement from a married lady, of whom he had been formerly enamoured, he had the integrity to resist the temptation; that he refused a gratification of a three hundred pounds bank-note, and afterwards of a diamond-ring of the same value, from a Major Dunbar, whom he had endeavoured to serve in Ireland by his interest with Lord Sunderland; and that his daughter by Lady Warwick died unmarried, residing at Bilton near Rugby, and possessing an income of more than twelve hundred a year.

The following letter, which probably relates to the case of Major Dunbar, reflects great honour on Mr Addison's integrity. "*June* 26. 1715. Sir,—I find there is a very strong opposition formed against you; but I shall wait on my lord-lieutenant this morning, and lay your case before him as advantageously as I can, if he is not engaged in other company. I am afraid what you say of his grace does not portend you any good. And now, Sir, believe me, when I assure you I never did, nor ever will, on any pretence whatsoever, take more than the stated and customary fees of my office. I might keep the contrary practice concealed from the world, were I capable of it, but I could not from myself; and I hope I shall always fear the reproaches of my own heart more than those of all mankind. In the mean time, if I can serve a gentleman of merit, and such a character as you bear in the world, the satisfaction I meet with on such an occasion is always a sufficient, and the only reward to, Sir, your most obedient humble servant, J. Addison."

The anecdote which follows was told by the late Dr Birch. Addison and Mr Temple Stanyan were very intimate. In the familiar conversations which passed between them, they were accustomed freely to dispute each other's opinions. Upon some occasion Mr Addison lent Stanyan five hundred pounds. After this Mr Stanyan behaved with a timid reserve, deference, and respect; not conversing with the same freedom as formerly, or canvassing his friend's sentiments. This gave great uneasiness to Mr Addison. One day they happened to fall upon a subject, on which Mr Stanyan had always been used strenuously to oppose his opinion. But even upon this occasion he gave way to what his friend advanced, without interposing his own view of the matter. This hurt Mr Addison so much, that he said to Mr Stanyan, "Either contradict me, or pay me the money."

In Tickell's edition of Mr Addison's works, published in 4 vols. 4to, there are several pieces hitherto unmentioned, viz. The Dissertation on Medals; The Present State of the War, and the Necessity of an Augmentation considered; The late Trial and Conviction of Count Tariff; The Whig Examiner. Five of these papers were attributed to Mr Addison, and they are the severest pieces he ever wrote. He is said also to have been the author of a performance entitled *Dissertatio de insignioribus Romanorum Poetis*, and of a Discourse on Ancient and Modern Learning.

ADDITAMENT, something added to another. Thus physicians call the ingredients added to a medicine already compounded, *additaments*.

ADDITION, in *Music*, a dot marked on the right side of a note, signifying that it is to be sounded or lengthened half as much more as it would have been without such mark.

Addition, in *Law*, is that name or title which is given to a man over and above his proper name and surname, to show of what estate, degree, or mystery he is; and of what town, village, or country.

Additions of Estate or *Quality* are, Yeoman, Gentleman, Esquire, and such like.

Additions of Degree are those we call names of dignity; as Knight, Lord, Earl, Marquis, and Duke.

Additions of Mystery are such as Scrivener, Painter, Mason, and the like.

Additions of Place are, of Thorpe, of Dale, of Woodstock. Where a man hath household in two places, he shall be said to dwell in both, so that his addition in either may suffice. By stat. 1 Hen. V. cap. 5. it was ordained, that in such suits or actions where process of outlawry lies, such addition should be made to the name of the defendant, to show his estate, mystery, and place where he dwells; and that the writs not having such additions should abate if the defendant take exception thereto, but not by the office of the court. The reason of this ordinance was, that one man might not be troubled by the outlawry of another; but by reason of the certain addition, every person might bear his own burden.

Additions, in *Distilling*, a name given to such things as are added to the wash or liquor while in a state of fermentation, in order to improve the vinosity of the spirit, procure a larger quantity of it, or give it a particular flavour. All things, of whatever kind, thus added in the time of fermentation, are called by those of the business who speak most intelligently, *additions;* but many confound them with things of a very different nature, under the name of *ferments.*

Additions, in *Heraldry*, some things added to a coat-of-arms, as marks of honour; and therefore directly opposite to abatements. Among additions we reckon Bordure, Quarter, Canton, Gyron, Pile, &c.

ADDRESS, in a general sense, is used for skill and good management, and of late has been adopted from the French. It is used also in commerce, as synonymous with direction to a person or place. The word is formed of the French verb *adresser*, to direct any thing to a person.

ADDUCENT Muscles, or Adductors, in *Anatomy*, are those muscles which pull one part of the body towards another.

ADEB, in *Commerce*, the name of a large Egyptian weight, used principally for rice, and consisting of 210 okes, each of three rotolos, a weight of about two drams less than an English pound. But this is no certain weight, for at Rosetto the adeb is only 150 okes.

ADEL, a kingdom on the eastern coast of Africa, which reaches as far as the Straits of Babelmandel, which unite the Red Sea to the sea of Arabia. This country produces corn, and feeds a great number of cattle. The inhabitants carry on a trade in gold, silver, ivory, oil, frankincense, a sort of pepper, and other merchandises of Arabia and the Indies. The king was formerly a vassal to the grand negus of Abyssinia; but being Mahometans, and the Abyssinians a sort of Christians, they could not agree, and in 1535 came to an open rupture, when the Adelians threw off the yoke, seeking protection from the grand signior. The principal places are Adela, seated in the centre of the country, and the town where the king resides.

ADELFORS, a town in Sweden, in the province of Jönköping and district of Oestra, wherein are two gold mines worked but very sluggishly; whilst the iron mines found there are very productive, and give employment both to the forges in making bar-iron, and to individuals as nail-makers.

ADELME, or Aldhelm, son to Kenred, nephew to Ina, king of the West Saxons, was bishop of Sherburn in the time of the Heptarchy. He was the first Englishman who wrote in Latin, and the first who made any considerable attempts in versification. He lived in great esteem till his death, which happened in 709. He was canonized, and many miracles were ascribed to him. He is mentioned with great honour by Camden and Bale; and his life was written by William of Malmesbury.

ADELNAU, a circle in the province of Posen, in Prussia. It extends over 346 square miles, or 324,440 acres, and contains, in four cities and 111 villages, 31,718 inhabitants. The river Proszna waters the east side, and the Ollabok the centre of the circle. There are several smaller rivers, and some lakes, the most considerable of which bears the name of the chief place near to which it is found. It is a poor district, abounding with woods and game, and yielding fresh-water fish in plenty. It is very deficient in corn and cattle. The capital, of the same name, contains two Catholic and one Lutheran church, with 147 houses, and 1112 inhabitants.

ADELPHIANI, in *Church History*, a sect of ancient heretics, who fasted always on Sundays.

ADELSCALC, in ancient customs, denotes a servant of the king. The word is also written *adelscalche*, and *adelscalus*. It is compounded of the German *adel*, or *edel*, noble, and *scalc*, servant. Among the Bavarians, *adelscalcs* appear to have been the same with royal *thanes* among the Saxons, and those called *ministri regis* in ancient charters.

ADELSHEIM, a city in the bailiwick of Osterburken, and circle of the Maine and Tauber, in the grand duchy of Baden. It belongs to a mediatised family of the same name, is walled, has two churches, 200 houses, and 1264 inhabitants.

ADELSO, an island in Sweden, in the same lake in which the city of Stockholm is built, a little to the west of Munso, containing a parish of the same name.

ADELUNG, John Christopher, a very eminent German grammarian, philologer, and general scholar, was born at Spantekow in Pomerania, on the 30th of August 1734. He acquired his elementary instruction at the public school of Anclam, and that of Closterbergen, near Magdeburg, and completed his academical education at the university of Halle. In the year 1759 he was appointed professor at the gymnasium of Erfurt, but relinquished this situation two years after, and went to reside in a private capacity at Leipsic, where he continued to devote himself for a long period to the cultivation of letters, and particularly to those extensive and laborious philological researches which proved so useful to the language and literature of his native country. In 1787 he received the appointment of principal librarian to the elector of Saxony at Dresden, with the honorary title of Aulic Counsellor. Here he continued to reside during the remainder of his useful life, discharging with diligence and integrity the duties of his situation, and prosecuting his laborious studies to the last with indefatigable industry and unabated zeal. He died at Dresden on the 10th of September 1806, at the age of 72.

The life of a mere scholar is generally destitute of interest; and that of Adelung, which was spent entirely in literary seclusion, presents no variety of incident to the pen of the biographer. Of his private character and habits few memorials have been preserved; but in these few he is represented as a man of an amiable disposition. He was never married. His constitution, which was remarkably robust, rendered him capable of the most intense and unremitted application to study, insomuch that, down to the period of his death, he is said to have devoted fourteen hours of every day to literary labour. He was a lover of good cheer, and spared neither pains nor expense in procuring a variety of foreign wines, of which his cellar, which he facetiously denominated his *Bibliotheca Selectissima*, is said to have contained no less than forty different kinds. His manners were easy and affable, and the habitual cheerfulness of his disposition rendered his society most acceptable to a numerous circle of friends.

The works of Adelung are very voluminous; and there is not one of these, perhaps, which does not exhibit some proofs of the genius, industry, and erudition of the author. But although his pen was usefully employed upon a variety of subjects in different departments of literature and science, it is to his philological labours that he is principally indebted for his great reputation; and no man ever devoted himself with more zeal and assiduity, or with greater success, to the improvement of his native language.

In a country which is subdivided into so many distinct sovereign states, possessing no common political centre, and no national institution whose authority could command deference in matters of taste,—in a country whose indigenous literature was but of recent growth, and where the dialect of the people was held in contempt at the several courts,—it was no easy task for a single writer to undertake to fix the standard of a language which had branched out into a variety of idioms, depending in a great measure upon principles altogether arbitrary. Adelung effected as much in this respect as could well be accomplished by the persevering labours of an individual. By means of his excellent grammars, dictionary, and various works on German style, he contributed greatly towards rectifying the orthography, refining the idiom, and fixing the standard of his native tongue. Of all the different dialects, he gave a decided preference to that of the margraviate of Misnia, in Upper Saxony, and positively rejected every thing that was contrary to the phraseology in use among the best society of that province, and in the writings of those authors whom it had produced. In adopting this narrow principle, he is generally thought to have been too fastidious. The dialect of Misnia was undoubtedly the richest, as it was the earliest cultivated, of any in Germany; but Adelung probably went too far in restraining the language within the limits of this single idiom, to the exclusion of others, from which it might have, and really has, acquired additional richness, flexibility, and force.

His dictionary of the German language is generally allowed to be superior to our English dictionary by Dr Johnson. It is eminently so in its etymologies; and is, perhaps, upon the whole, the best work of the kind of which any nation can boast. Indeed, the patient spirit of investigation which Adelung possessed in so remarkable a degree, together with his intimate knowledge of the ancient history and progressive revolutions of the different dialects from which the modern German is derived, rendered him peculiarly qualified for the successful performance of the duties of a lexicographer.

It would greatly exceed our limits, and lead us into far too wide a field, were we to attempt to present our readers with an analysis of the several productions of this voluminous author; but we should do injustice to his memory, were we to pass over in total silence his last very learned work, entitled *Mithridates, or a General History of Languages, with the Lord's Prayer, as a specimen, in nearly five hundred languages and dialects.* The hint of this work appears to have been taken from a publication, with a similar title, published by the celebrated Conrad Gesner in 1555; but the plan of Adelung is much more extensive. Unfortunately, he did not live to finish what he had undertaken; but the work has been continued with much ability by that eminent philologer, Professor Vater, formerly of Halle, now of Königsberg. The first volume, which contains the Asiatic languages, was published immediately after the death of Adelung; the second, which comprehends the European dialects, was published by Professor Vater in 1809; the first part of the third volume, which is almost entirely the work of the last-mentioned scholar, appeared in 1812. This third and last volume is to contain the languages of Africa and America, and will be enriched with some very valuable materials, communicated to the editor by Baron de Humboldt.

Many of the works of Adelung were published anonymously, but we believe the following list will be found to be complete and correct.

1. *Neue Schaubühne der vorfallenden Staats-Kriegs und Friedenshändel.* New Theatre of Historical and Political Events. Erfurt, 1759-61, 8vo.
2. *Neues Lehrgebäude der Diplomatik, aus dem Franz. übersetzt, und mit Anmerk. versehen.* New System of Diplomacy, translated from the French, with Notes. Vols. i. ii. iii. Erfurt, 1760–63, 4to.
3. *Neue Denkwürdigkeiten der gegenwärtigen Geschichte von Europa.* New Memoirs of the present History of Europe. 1761, 2 vols. 8vo.
4. *Geschichte der Streitigkeiten zwischen Dänemark und den Herzogen von Holstein-Gottorp.* History of the Disputes between Denmark and the Dukes of Holstein-Gottorp. Frankf. Leipsic, 1762, 4to.
5. *Pragmatische Staatsgeschichte Europens von dem Ableben Kaiser Karls des 6ten an.* Pragmatic History of Europe, from the death of the Emperor Charles VI. Vols. i.–ix. Gotha, 1762–9, 4to.
6. *Auserlesene Staatsbriefe.* Select Letters on Affairs of State. Gotha, 1763–4, 3 vols. 8vo.
7. *Vollständige Geschichte der Schiffahrten nach den Südländern.* A Complete History of the Voyages undertaken to Australasia, translated from the French of the President De Brosses, with Notes. Halle, 1767, 4to.
8. *Mineralogische Belustigungen.* Mineralogical Recreations. Vols. i.–vi. Copenhagen and Leipsic, 1767–71, 8vo.
9. *Einleitung zur allgemeinen Weltgeschichte.* Introduction to Universal History. Berlin, 1767, 2 vols. The first volume by Prof. Franz.
10. *Werke des Philosophen von Sans Souci.* The Works of the Philosopher of *Sans Souci*, translated from the French. Erfurt, 1768.
11. *Staatsmagazin*, 14 *Stücke.* Fourteen Numbers of the Political Magazine. Leipsic, 1766–8.
12. *Geschichte der Schiffahrten und Versuche, welche zur Entdeckung des nordöstlichen Wegs nach Japan und China unternommen worden.* History of Voyages undertaken with a view to discover the North-east Passage to Japan and China. Halle, 1768, 4to.
13. *Versuch einer neuen Geschichte des Jesuiter ordens.* Essay towards a new History of the Order of the Jesuits. Vols. i. and ii. Berlin and Halle, 1769 and 1770, 8vo.
14. *Natürliche und bürgerliche Geschichte von Californien.* Natural and Civil History of California, translated from the English. Lemgo, 1769–70, 3 vols. 4to.
15. *Unterweisung in den vornehmsten Künsten und Wissenschaften, zum Nutzen der niedern Schulen.* Elements of Instruction in the principal Arts and Sciences, for the use of the lower Schools. Frankfort and Leipsic, 1771, 8vo. Reprinted in 1775, 1777, and 1789.
16. *Glossarium Manuale ad Scriptores mediæ et infimæ Latinitatis, ex magnis Glossariis Caroli du Fresne Domini Ducange et Carpentarii, in compendium redactum, multisque verbis et dicendi formulis auctum.* Tomi v. Halle, 1772–78. This is a useful abridgement of the Dictionary of Ducange, with Charpentier's additions.
17. *Versuch eines vollständigen grammatisch-kritischen Wörterbuchs der Hoch Teutschen Mundart, mit beständiger Vergleichung der übrigen Mundarten, besonders aber der Ober Teutschen.* Essay towards a complete Grammatical and Critical Dictionary of the High German Dialect, with a constant comparison of the other Dialects, particularly the Upper German. 1774–86, 5 vols. 4to.
18. *Wallerius Chemie.* Waller's Chemistry, translated from the Latin.
19. *Allgemeines Verzeichniss neuer Bücher, mit kurzen Anmerkungen, nebst einem gelehrten Anzeiger, auf das Iahr* 1776. A General Catalogue of new Books, with short Notes, and an Index, for the year 1776. Leipsic, 1776, 8vo. Also the 2d, 3d, 4th, 5th, and 6th annual series of the same periodical publication, down to 1781.
20. *Schauplatz des Baierischen Erbfolge Kreigs, u. s. w.* Theatre of the War of the Bavarian Succession, &c. 6 numbers. Leipsiç, 1778, 1780, 4to.
21. *Militarisches Taschenbuch auf das Iahr* 1780. Military Pocket-book for the Year 1780. Leipsic, 12mo.
22. *J. Williams Ursprung, Wachsthum und Gegenwärtiger Zustand der Nordischen Reiche.* J. Williams's Origin, Progress, and Present State of the Northern Governments, translated and corrected from the English. Leipsic, 1779–81, 2 vols. 8vo.
23. *Kurzer Begriff menschlicher Kenntnisse und Fertigkeiten, so fern sie auf Erwerbung des Unterhalts, auf Vergnügen, auf Wissenschaft, und auf Regierung der Gesellschaft abzielen.* A Short Compendium of Arts and Sciences, so far as they have for their object to satisfy the wants, to increase the pleasures of life, and to regulate the government of society. Leipsic, 1778–81. 2d edit. 1783–9. 4 vols. 8vo.
24. *Ueber die Geschichte der Teutschen Sprache, über Teutsche Mundarten und Teutsche Sprachlehre.* On the History of the German Language, on German Dialects, and German Grammar. *Ibid.* 1781, 8vo.
25. *Ueber den Ursprung der Sprache und den Bau der Wörter.* On the Origin and Structure of Language. *Ibid.* 1781, 8vo.
26. *Teutsche Sprachlehre, zum Gebrauch der Schulen in den Königl. Preuss. Landen.* German Grammar, for the use of the schools in his Prussian Majesty's dominions. Berlin, 1781. 2d edit. improved and enlarged. 1792. This grammar has been frequently reprinted.
27. *Auszug aus der Teutschen Sprachlehre für Schulen.*

Abridgement of the German Grammar for Schools. 1781, 8vo.

28. *Lehrgebäude der Teutschen Sprache, zur Erläuterung der Teutschen Sprachlehre für Schulen.* Theory of the German Language, to illustrate the German Grammar for Schools.
29. *Tindals und Sr More Ammerkungen zu Rapins Geschichte von England.* Tindal's and More's Notes to Rapin's Hist. of Engl. Translated from the English.
30. *Versuch einer Geschichte der Cultur des Menshlichen Geschlechts.* Essay towards a History of the Civilisation of the Human Race. 1782, 8vo.
31. *Leipziger Politische Zeitung und Allerley.* Leipsic Political Journal and Miscellanies.
32. *Neues Grammatisch-kritisches Wörterbuch der Englischen Sprache, für die Teutschen.* New Grammatical and Critical Dictionary of the English Language, for Germans. Leipsic, 1783, 8vo.
33. *Beyträge zur Bürgerlichen Geschichte, zur Geschichte der Cultur, zur Naturgeschichte, Naturlehre, und dem Feldbaue; aus den Schriften der Akademie der Wissenschaften zu Brüssel.* Contributions to Civil History, to the History of Culture, to Natural History, Natural Philosophy, and Agriculture; from the Transactions of the Academy of Sciences at Brussels. Leipsic, 1783, 8vo.
34. *Forsetzungen und Ergänzungen zu Christ. Gottl. Iöchers allgemeinem Gelehrten Lexico.* Continuations and Additions to Christ. Gottl. Iöcher's General Dictionary of Literature. These additions by Adelung extend from letter A to K. Leipsic, 1784, 2 vols. 4to.
35. *Ueber den Teutschen Styl.* On German Style. Berlin, 1785, 3 vols. 8vo.
36. *Neue Leipziger Gelehrte Zeitung.* The New Leipsic Literary Journal. This work was conducted by Adelung in 1785 and following years.
37. *Grundsätze der Teutschen Orthographie.* Principles of German Orthography. Leipsic, 1782, 8vo.
38. *Geschichte der Menschlichen Narrheit oder Lebens beschreibungen berühmter Schwarzkünstler, Goldmacher, Teufelsbanner, Zeichen und Liniendeuter, Schwärmer, Wahrsager und anderer philosophischer Unholden.* A History of Human Folly; or Lives of the most celebrated Necromancers, Alchemists, Conjurors, Astrologers, Soothsayers, &c. Leipsic, 1785–87–89, 7 vols.
39. *Geschichte der Philosophie für Leibhaber.* A History of Philosophy, for Amateurs. 1786–87, 3 vols.
40. *Volständige Anweisung zur Teutschen Orthographie, nebst einem kleinen Wörterbuche für die Aussprache, Orthographie, Biegung und Ablietung.* Complete System of German Orthography, with a small Dictionary for Pronunciation, Orthography, Derivation, &c. Leipsic, 1786, 2 vols. 2d edit. 1790.
41. *Jacob Püterich von Reicherzhausen, ein Kleiner Beytrag zur Geschichte der Teustchen Dichtkunst im Schwäbischen Zeitalter.* Jacob Püterich, &c. a small Contribution to the History of German Poetry in the age of the Suabian Minstrels. Leipsic, 1788, 4to.
42. *Auszug aus dem Grammatisch-kritischen Wörterbuch der Hohen Teutschen Mundart.* Abridgement of the Grammatical and Critical Dictionary of the High German Dialect. Leipsic, 1793, 1 vol. 1795, 2 vols. 8vo.
43. *Mithridates, oder Allgemeine Sprachenkunde.* Mithridates, or a General History of Languages, with the Lord's Prayer, as a specimen, in nearly five hundred Languages and Dialects. Berlin, vol. i. 1806; vol. ii. 1809; vol. iii. part i. 1812. This great work was left by Adelung in an unfinished state; but, as already mentioned, it has been continued by that able philologer Professor Vater of Königsberg, to whom the public is indebted for an excellent Hebrew Grammar.

It is observed by Madame de Stael, that the English are much better acquainted than the French with the literature of Germany; but we have met with very few possessed of any knowledge of the works of this learned and celebrated writer; and, with the exception of one or two of his smaller essays, none of them, we believe, has ever been translated into the language of this country. In the above list there are more than one work which might probably be published with advantage in the English tongue. (K.)

ADEMPTION, in the *Civil Law*, implies the revocation of a grant, donation, or the like.

ADEN, a city on the Arabian coast, to the east of the Straits of Babelmandel. It is situated in Lat. 12. 50. N. Long. 45. 10. E. According to the Arabians, it derives its name from Aden, the son of Saba, and grandson of Abraham. Be this as it may, it was once the most flourishing city of Arabia, though it now presents little more than a heap of ruins surrounded with miserable huts. But it is nevertheless a place of considerable consequence on that coast, from the superiority of its harbour, and its other advantages for trade. It is accessible at all times of the year; and from it a constant intercourse may be maintained with the coast of Africa. Coffee of the best quality, and all the other articles which enter into the commerce of the Red Sea, may be procured at this port. In particular, it is the chief mart for the gums brought over from the north-eastern districts of Africa; on which account this drug may be procured here at a cheaper rate than at Mocha. The English traders are much in favour at Aden. —See Salt's *Voyage to Abyssinia*, and Milburn's *Oriental Commerce.*

ADENANTHERA, in *Botany*, BASTARD FLOWER-FENCE.

ADENAU, a circle in the department Rhine Moselle, in the Prussian province of the Lower Rhine. It extends over 172 square miles, or 110,080 acres, and contains 19,210 inhabitants, all Catholics, except 16 Jews and eight Protestants, in one city, three market towns, and 267 villages. It is watered by the river Ahr. It is generally a hilly and woody country, where little corn except oats grows, and where the chief subsistence is potatoes. Cattle and sheep are bred with tolerable success; and potashes and charcoal are made from the forests. There is some little employment furnished by spinning and weaving both linens and woollens on a small scale. The chief place of the same name contains 1250 inhabitants.

ADENBURG, or ALDENBURG, a town of Westphalia, and in the duchy of Berg, subject to the elector palatine. It is 12 miles north-east of Cologne, and 17 west of Bonn. Long. 7. 25. E. Lat. 51. 2. N.

ADENOGRAPHY, that part of anatomy which treats of the glandular parts.

ADENOIDES, glandulous, or of a glandular form; an epithet applied to the PROSTATÆ.

ADENOLOGY, the same with ADENOGRAPHY.

ADENOS, a kind of cotton: otherwise called *marine cotton.* It comes from Aleppo by the way of Marseilles.

ADEONA, in *Mythology*, the name of a goddess invoked by the Romans when they set out upon a journey.

ADEPHAGIA, in *Mythology*, the goddess of gluttony, to whom the Sicilians paid religious worship.

ADEPS, in *Anatomy*, the fat found in the abdomen. It also signifies animal fat of any kind.

ADEPTS, a term among alchemists for those who pretended to have found the panacea and philosopher's stone.

"Such is the nature," says Paracelsus, "of this higher philosophy, that one mortal can no more communicate it to another, than the paper on which letters are traced can of itself declare their meaning. It originates not from man, but from heaven."

ADERBIJAN. See Adirbeitsan.

ADERNO, a city at the foot of Mount Etna in Sicily, in the intendancy of Catania. It is built in an unhealthy situation, but contains 6600 inhabitants. It has several churches, the chief of which is supported by beautiful pillars of polished lava. It is the site of the ancient city Hadranum, whose ruins are still visible. In the river Giarretta, which passes the city, is a remarkable waterfall.

ADES, or Hades, denotes the invisible state. In the heathen mythology, it comprehends all those regions that lie beyond the river Styx, viz. Erebus, Tartarus, and Elysium. See Hell.

ADESSENARIANS, Adessenarii, in *Church History*, a sect of Christians who hold the real presence of Christ's body in the eucharist, though not by way of transubstantiation. They differ considerably us to this presence; some holding that the body of Christ is in the bread, others that it is about the bread, and others that it is under the bread.

ADFILIATION, a Gothic custom, whereby the children of a former marriage are put upon the same footing with those of the second. This is also called *unio prolium*, and still retained in some parts of Germany; though Heineccius observes that this is not adoption.

ADHA, a festival which the Mahometans celebrate on the 10th day of the month *Dhoulhegiat*, which is the 12th and last of their year. This month being particularly destined for the ceremonies which the pilgrims observe at Mecca, it takes its name from thence; for the word signifies *the month of Pilgrimage*. On that day they sacrifice with great solemnity, at Mecca, and nowhere else, a sheep, which is called by the same name as the festival itself. The Turks commonly call the festival the *Great Bairam*, to distinguish it from the lesser, which ends their fast, and which the Christians of the Levant call the *Easter of the Turks*. The Mahometans celebrate this festival, out of the city of Mecca, in a neighbouring valley; and sometimes they sacrifice there a camel.

ADHESION, a term chiefly used to denote the force with which the surface of a solid remains attached to the surface of a liquid, after they have been brought into contact. Suppose a polished glass plate to be suspended horizontally from one extremity of a balance, and to be exactly counterpoised by weights put into the opposite scale; if we bring this plate in contact with the surface of a quantity of mercury, we shall find that a certain additional weight must be placed in the opposite scale in order to separate the glass from the mercury. The force which kept the two bodies in contact is called *adhesion*. Three sets of experiments on this subject have been published by different philosophers.

Dr Brook Taylor, in a paper on *Magnetism*, inserted in the Philosophical Transactions for 1721, describes the result of his trials to determine the weight necessary to separate fir-boards of different sizes from the surface of water. The result of his experiments was, that the weight necessary is proportional to the surface of the fir-board to be raised.

In the year 1773, Guyton-Morveau ascertained experimentally the force of adhesion of eleven different metals of mercury. The metals which he employed were pure. The surface of each was an inch (French) in diameter, and polished. The following table exhibits the weight in French grains necessary to separate each metal from the mercury.

Gold	446
Silver	429
Tin	418
Lead	397
Bismuth	372
Platinum	282
Zinc	204
Copper	142
Antimony	126
Iron	115
Cobalt	8

M. Morveau ascertained likewise that the adhesive force is not diminished by removing the pressure of the air.

A great number of experiments on the same subject were made at a still later period by Mr Achard of Berlin. He measured the force of adhesion between various substances and water. He found that when the temperature was increased, the adhesion proportionally diminished. He even attempted to determine the diminution occasioned by the elevation of temperature, amounting to a single degree of the thermometer; and gives us a formula denoting that diminution. But it is not necessary to enter into any details respecting his experiments here, for a reason that will appear immediately.

Besides these three philosophers, many others have examined the rise of liquids in capillary tubes, a phenomenon which is nothing else than a peculiar case of adhesion, though we cannot with propriety treat of it here. Laplace published a dissertation on the subject in the year 1805, in which he has given us an historical detail, which, however, is far from accurate. His reasoning appears to us in general correct; though several very plain propositions are rather obscured than elucidated by his mathematical demonstrations.

When we make experiments on the adhesion of solids to liquids, and endeavour to ascertain the force requisite to separate them from each other, two cases may occur: the solid body may separate from the liquid *dry*, or its surface may be covered with a thin coating of the liquid, which it retains. If a surface of tallow be placed in contact with water, and separated from it by weights successively introduced into the opposite scale, we shall find, after the separation has taken place, that the surface of the tallow is *dry*, or that it has not carried along with it a thin coating of the water. But when we employ a fir-board, as Dr Brook Taylor did in his experiments, and as Mr Achard did in many of his, the case is very different: we shall find the whole surface of the board thoroughly *wetted*; that is to say, a thin film of the liquid remains adhering to the wood. Now, it is only the first of these two cases that can be considered as exhibiting the true force of adhesion. In the second case, it is not the solid which separates from the liquid, but one portion of the liquid which separates from the other. Such experiments, therefore, really show the force of cohesion between the particles of the liquid, not the force of adhesion between the solid and the liquid. Now, as the experiments of Brook Taylor and Achard belong all to this last case, it is obvious that they cannot be considered as experiments on adhesion. We must therefore leave them out of our consideration at present. The cohesion of the particles of liquids is well known to diminish as the temperature increases, till at a certain temperature this cohesion disappears altogether, and the liquids assume the state of elastic fluids, the particles of which repel each other. Hence the reason why, in Achard's experiments, the adhesive force diminished as the temperature increased.

Adhesion is obviously an attractive force, by which the two surfaces are kept in contact. It must evidently increase as the surfaces adhere, because the number of adhering particles increase in the same ratio. This force is insensible when the two surfaces are at any perceptible distance from one another; so that it acts only at insensible distances. From Morveau's experiments it appears, that it differs very much in intensity when different solids are made to adhere to the same liquid. Thus, gold adheres to mercury with a force more than twice as great as zinc does, and almost fifty-six times as great as cobalt does. Now these two properties, namely, acting only at insensible distances, and varying in intensity in different bodies, characterize that peculiar force known by the name of *chemical affinity*. But there is one particular in which chemical affinity appears at first sight to differ from adhesion. Chemical affinity is confined to the ultimate particles or atoms of bodies; whereas adhesion takes place between surfaces of any size whatever.

But if we consider that these surfaces consist each of a congeries of atoms united into a large mass by the force of cohesion; that adhesion is not sensible at any perceptible distance, however great the extent of surfaces may be; and that its strength increases in proportion to the surfaces;—if we consider these phenomena, we shall find reason to conclude that adhesion is a force which acts only between the atoms or integrant particles of bodies. It is therefore merely a case of *chemical affinity*.

The phenomena of adhesion depend upon the strength of affinity between the adhering bodies. If the affinity be weak, the two surfaces will separate by a small force applied, and the solid will retain no impression of the liquid whatever. This happens when cobalt is brought in contact with mercury, or tallow with water. If the affinity be strong, a considerable force will be requisite to separate the two surfaces. This is the case when gold or silver is brought in contact with mercury. So great is the affinity indeed in these cases, that if the adhesion continue for a short time, a combination actually takes place between the two metals. In that case the gold comes away white, or coated over with a film of mercury; the experiment is no longer an example of the force of adhesion between mercury and gold, but exhibits the cohesive force of the particles of mercury to each other. We have even found that this holds with platinum, though it be a metal which has a much weaker affinity for mercury than gold has. If a clean surface of platinum be kept for some time in contact with that of mercury, a very evident amalgamation takes place.

When a surface of wood, marble, or metal, comes in contact with water, on removing it we find that surface moist; that is to say, it has carried with it a thin film of water. This shows us that the adhesive force of water, or the affinity of water to these different bodies, is greater than the cohesive force of the particles of water to each other. Yet this force is not sufficiently strong to produce a chemical combination between the respective bodies. When a surface of sugar or common salt comes in contact with water, this surface is not merely wetted. If the contact be continued for a sufficient time, the solid loses its cohesion, and is dissolved by the liquid. This is a complicated case. The water by capillary attraction insinuates itself through the pores of the sugar. The minute crystals of sugar are deprived of their cohesion to each other by this intervening liquid. Being separated from each other, they gradually dissolve or enter into a chemical combination with the water. (L.)

ADHIL, in *Astronomy*, a star of the sixth magnitude, upon the garment of Andromeda, under the last star in her foot.

ADIANTUM, in *Botany*, MAIDEN-HAIR.

ADIAPHORISTS, in *Church History*, a name importing lukewarmness, given in the 16th century to the moderate Lutherans, who embraced the opinion of Melanchthon, whose disposition was much more pacific than that of Luther.

ADJAZZO, ADRAZZO, or AJACCIO, a handsome town and castle of Corsica, in the Mediterranean, with a bishop's see and a good harbour. It is populous, and fertile in wine. It is 27 miles south-west of Corte. Long. 41. 54. E. Lat. 38. 5. N.

ADJECTIVE, in *Grammar*, a kind of noun joined with a substantive, either expressed or implied, to denote its qualities or incidents.

ADIGE, a river in Italy, which, taking its rise south of the lake Glace, among the Alps, runs south by Trent, then east by Verona, in the territory of Venice, and falls into the Gulf of Venice north of the mouth of the Po.

ADJOURNMENT, the putting off a court or other meeting till another day. There is a difference between the adjournment and the prorogation of the parliament; the former not only being for a shorter time, but also done by the house itself; whereas the latter is an act of royal authority.

ADIPOCIRE, derived from *adeps*, fat, and *cera*, wax, denotes a substance which has been lately examined by chemists. It is formed by a certain change which the soft parts of animal bodies undergo when kept for some time in running water, or when a great number of dead bodies are heaped together in the same place. Great quantities of this substance were found on removing the animal matters from a burial-ground at Paris in the year 1787. In this burial-ground 1200 or 1500 bodies were thrown together into the same pit, and being decomposed, were converted into this substance. It has some of the properties of wax or spermaceti.

ADIPOSE, a term used by anatomists for any cell, membrane, &c. that is remarkable for its fatness.

ADIRBEITSAN, in *Geography*, a province of Persia, in Asia, and part of the ancient Media. It is bounded on the north by the province of Schirvan, on the south by Irac-Agemi and Kurdistan, on the east by Ghilan and the Caspian Sea, and on the west by Turcomania. Long. 42. to 48. E. Lat. 36. to 39. N.

ADIT, in a general sense, the passage to, or entrance of, any thing.

ADIT of a Mine, the hole or aperture whereby it is entered and dug, and by which the water and ores are carried away. The term is sometimes used for the *air-shaft*, which is a hole driven perpendicularly from the surface of the earth into some part of the mine, to give entrance to the air.

ADJUDICATION, in *Scotish Law*, the name of that action by which a creditor attaches the heritable estate of his debtor, or his debtor's heir, in order to appropriate it to himself either in payment or security of his debt; or that action by which the holder of an heritable right, labouring under any defect in point of form, may supply that defect.

ADJUNCT, among philosophers, signifies something added to another, without being any necessary part of it. Thus, water absorbed by cloth or a sponge is an adjunct, but no necessary part of either of these substances.

ADJUNCT, in *Metaphysics*, some quality belonging to either the body or mind, whether natural or acquired. Thus, thinking is an adjunct of the mind, and growth an adjunct of the body.

ADJUNCT, in *Music*, a word which is employed to denominate the connection or relation between the principal mode and the modes of its two-fifths, which, from the intervals that constitute the relation between them and it, are called its *adjuncts*.

Adjuncts, in *Rhetoric* and *Grammar*, signify certain words or things added to others, to amplify or augment the force of the discourse.

Adjunct Gods, or *Adjuncts of the Gods*, among the Romans, were a kind of inferior deities, added as assistants to the principal ones, to ease them in their functions. Thus, to Mars was adjoined Bellona and Nemesis; to Neptune, Salacia; to Vulcan, the Cabiri; to the Good Genius, the Lares; to the Evil, the Lemures, &c.

ADJUTANT, in the military art, is an officer whose business it is to assist the major. Each battalion of foot and regiment of horse has an adjutant, who receives the orders every night from the brigade-major; which, after carrying them to the colonel, he delivers out to the serjeants. When detachments are to be made, he gives the number to be furnished by each company or troop, and assigns the hour and place of rendezvous.

Adjutants-general, among the Jesuits, a select number of fathers, who resided with the general of the order, each of whom had a province or country assigned him, as England, Holland, &c.; and their business was to inform the father-general of state occurrences in such countries. To this end they had their correspondents delegated, emissaries, visitors, regents, provincials, &c.

ADJUTORIUM, a term used by physicians for any medicine in a prescription but the capital one.

ADLE Eggs, such as have not received an impregnation from the semen of the cock.

ADLEGATION, a term formerly used in the public law of the German empire, to denote the right claimed by the states of the empire of adjoining plenipotentiaries, in public treaties and negotiations, to those of the emperor, for the transacting of matters which relate to the empire in general; in which sense *adlegation* differs from *legation*, which is the right of sending ambassadors on a person's own account.

ADLOCUTION, Adlocutio, in *Antiquity*, is chiefly understood of speeches made by Roman generals to their armies, to encourage them before a battle. We frequently find those adlocutions expressed on medals by the abbreviature Adlocut. Coh.—The general is sometimes represented as seated on a tribunal, often on a bank or mound of turf, with the cohorts ranged orderly round him, in *manipuli* and *turmæ*. The usual formula in adlocutions was, *Fortis esset ac fidus.*

ADMANUENSES, in ancient law-books, persons who swore by laying their hands on the book, as was the case with laymen. Clerks did not swear on the book, their word being reputed as their oath; whence they were also denominated *fide digni.*

ADMINICLE, a term used chiefly in old law-books to imply an aid, help, assistance, or support. The word is Latin, *adminiculum*; and derived from *adminiculor*, to prop or support.

Adminicle, in *Scotish Law*, signifies any writing or deed referred to by a party, in an action of law, for proving his allegations.

ADMINICULATOR, an ancient officer of the church, whose business it was to attend to and defend the cause of widows, orphans, and others destitute of help.

ADMINISTRATION, in general, the government, direction, or management of affairs, and particularly the exercise of distributive justice. Among ecclesiastics, it is often used to express the giving or dispensing of the sacraments, &c.

ADMINISTRATOR, in *English Law*, he to whom the ordinary commits the administration of the goods of a person deceased, in default of an executor. If the administrator die, his executors are not administrators; but the court is to grant a new administration. The origin of administrators is derived from the civil law. Their establishment in England is owing to a statute made in the 31st year of Edward III. Till then, no office of this kind was known beside that of executor; in case of a want of which, the ordinary had the disposal of goods of persons intestate, &c.

Administrator, in *Scotish Law*, a person legally empowered to act for another whom the law presumes incapable of acting for himself.

Administrator is sometimes used for the president of a province; for a person appointed to receive, manage, and distribute the revenues of an hospital or religious house; for a prince who enjoys the revenues of a secularized bishop; and for the regent of a kingdom during the minority of a prince or a vacancy of the throne.

ADMIRABILIS Sal, the same with Glauber's Salt.

ADMIRAL, a great officer or magistrate, who has the government of a navy, and the hearing of all maritime causes.

Authors are divided with regard to the origin and denomination of this important officer. Sir Henry Spelman thinks that both the name and dignity were derived from the Saracens, and, by reason of the holy wars, brought amongst us; for *admiral*, in the Arabian language, signifies a prince, or chief ruler, and was the ordinary title of the governors of cities, provinces, &c.; and therefore they called the commander of the navy by that name, as a name of dignity and honour. Ducange assures us that the Sicilians were the first, and the Genoese the next, who gave the denomination of *admiral* to the commanders of their naval armaments; and that they took it from the Saracen or Arabic *emir*, a general name for every commanding officer. As for the exact time when the word was introduced among us, it is uncertain. Some think it was in the reign of Edward I. Sir Henry Spelman is of opinion that it was first used in the reign of Henry III. because neither the laws of Oleron, made in 1266, nor Bracton, who wrote about that time, make any mention of it. In the latter part of that reign, not only the historians, but the charters themselves, very frequently use the word *admiral*.

Anciently there were generally three or four admirals appointed for the English seas, all of them holding the office *durante beneplacito*, and each of them having particular limits under his charge and government; as admirals of the fleet of ships from the mouth of the Thames, northward, southward, or westward. Besides these, there were admirals of the Cinque Ports. We sometimes find that one person had been admiral of the fleets to the southward, northward, and westward; but the title of *Admiralis Angliæ* was not frequent till the reign of Henry IV. when the king's brother had that title given him, which in all commissions afterwards was granted to the succeeding admirals. It may be observed, that there was a title above that of admiral of England, which was, *locum tenens regis super mare*, the king's lieutenant-general of the sea: this title we find mentioned in the reign of Richard II. Before the use of the word *admiral* was known, the title of *custos maris* was made use of.

Of the rank of admiral there are three degrees; admiral, vice-admiral, rear-admiral. Each of these degrees consists of three divisions, which are distinguished by as many different colours or flags; hence all admirals assume the common title of *flag-officers*, and take rank and command in the following order:—

Admirals of the Red, of the White, of the Blue Squadrons, bearing their respective flags at the main-top-gallant-mast head; Vice-admirals of the Red, of the White, of the Blue Squadrons, bearing their respective flags at the fore-top-gallant-mast head; Rear-admirals of the Red, of the White, of the Blue Squadrons, bearing their respective flags at the mizen-top-gallant-mast head.

It may be remarked, that for a century nearly we had no Admiral of the Red Squadron; that flag, according to a vulgar error, having been taken from us by the Dutch in one of those arduous struggles for naval superiority which that nation was once able to maintain against the naval power of England. But the fact is, the red flag was laid aside on the union of the two crowns of England and Scotland, when the Union flag was adopted in its place, and usually hoisted by the admiral commanding in chief. The red flag, however, has recently been revived, on an occasion worthy of the event; namely, on the promotion of naval officers which took place in November 1805, in consequence of the memorable victory off Trafalgar. See NAVY.

ADMIRAL OF THE FLEET is a mere honorary distinction, which gives no command, but an increase of half-pay, his being three guineas a day, and that of an admiral two guineas. It is sometimes conferred, but not always, on the senior admiral on the list of naval officers, being held at present by his royal highness the duke of Clarence. If the admiral of the fleet should happen to serve afloat, he is authorized to carry the union flag at the main-top-gallant-mast head; which was the case when the duke of Clarence escorted Louis XVIII. across the Channel to take possession of the throne of France.

The comparative rank which flag-officers hold with officers in the army has been settled as follows by his Majesty's order in council:—

The admiral and commander-in-chief of the fleet has the rank of a field-marshal in the army; admirals with flags at the main take rank with generals of horse and foot; vice-admirals with lieutenant-generals; rear-admirals with major-generals; commodores with broad pendants with brigadier-generals. See NAVY.

ADMIRAL, THE LORD HIGH, OF ENGLAND, an ancient officer of high rank in the state, in whom not only the government of the navy is vested, but who, long before any regular navy existed in England, presided over a sovereign court, with authority to hear and determine all causes relating to the sea, and to take cognizance of all offences committed thereon.

There can be little doubt of the Asiatic origin of the name given to this officer, which does not appear to have been known in the languages of Europe before the time of the holy wars. *Amir*, in Arabic, is a chief or commander of forces; it is the same word as the *ameer* of the peninsula of India (as *ameer al omrah*, the chief of lords or princes), and the *emir* of the Turks or Saracens, who had, and still have, their *emir* or *ameer'l durea*, commander of the sea; *amir'l asker durea*, commander of the naval armament. The incorporation of the article with the noun appears, we believe, for the first time in the Annals of Eutychius, patriarch of Alexandria, in the tenth century, who calls the Caliph Omar *Amiral mumunim*, seu, *Imperator fidelium*. Spelman says, "In regno Saracenorum quatuor prætores statuit, qui *admiralli* vocabantur." The *d* is evidently impertinent, and is omitted by the French, who say *Amiral*. The Spanish write *Almirante;* the Portuguese the same. Milton would seem to have been aware of the origin of the word, when he speaks of "the mast of some great Ammiral." It is obvious, then, that the supposed derivations of αλμυρος from the Greek, *aumer* from the French, and *sea mereal* from the Saxon, are fanciful and unauthorized etymologies.

The period of time about which this officer first makes his appearance in the governments of European nations, corroborates the supposition of its having been adopted in imitation of the Mediterranean powers, at the return of the Christian heroes from the holy wars. According to Moreri, Florent de Varenne, in the year 1270, was the first admiral known in France; but by the most approved writers of that nation, the title was unknown till, in 1284, Enguerand de Coussy was constituted Admiral. The first admiral by name that we know of in England was W. de Leybourne, who was appointed to that office by Edward I. in the year 1286, under the title of *Admiral de la mer du Roy d'Angleterre*. Mariana, in his *History of Spain*, says that Don Sancho, having resolved to make war on the barbarians (Moors), prepared a great fleet; and as the Genoese were at that time very powerful by sea, and experienced and dexterous sailors, he sent to Genoa to invite, with great offers, Benito Zacharias into his service; that he accepted those offers, and brought with him twelve ships; that the king named him his admiral (*Almirante*), and conferred on him the office for a limited time. This happened in the year 1284. Several Portuguese authors observe, that their office of *Almirante* was derived from the Genoese, who had it from the Sicilians, and these from the Saracens; and it appears, from Souza's *Historia Genealogica da Caza Real*, that, in 1322, Micer Manuel Piçagow was invited from Genoa into Portugal, and appointed to the office of *Almirante*, with a salary of three thousand pounds (*livras*) a year, and certain lands, &c. on condition that he should furnish, on his part, twenty men of Genoa, all experienced in sea affairs, and qualified to be *alcaidis* (captains) and *arraises* (masters) of ships: all of which terms, *almirante*, *alcaidi*, and *arrais*, are obviously of Arabic derivation.

Edward I. who began his reign in 1272, went to the Holy Land, and visited Sicily on his return. He must therefore have had an opportunity of informing himself concerning the military and naval science of the various countries bordering on the Mediterranean—an opportunity which so able and warlike a prince would not neglect: but whether the title and office of admiral existed in England before his time, as some are inclined to think, or whether W. de Leybourne was first created to that office in 1286, as before mentioned, we believe there is no authentic record to enable us to decide. Supposing him, however, to be the first, Edward may either have adopted the office and title from the Genoese, or the Sicilians, or the Spaniards, or the French; or even had it directly from the Saracens, against whom he had fought, and with whom he had afterwards much amicable intercourse. It would seem, however, that the office was in Edward's time merely honorary; for that monarch, in 1307, orders the lord mayor of London, at his peril and without delay, to provide a good ship, well equipped, to carry his pavilions and tents; and, in the same year, another order is addressed to the *Vicecomes Kantiæ*, to provide, for immediate passage across the seas, *tot et tales pontes et claias* as the constable of Dover Castle should demand, without one word being mentioned of the admiral. (Rymer, vol. iii. p. 32.)

From the 34th Edward II. we have a regular and uninterrupted succession of admirals. In that year he appointed Edward Charles Admiral of the North, from the mouth of the river Thames northward, and Gervase Allard Admiral of the West, from the mouth of the Thames westward; and these two admirals of the north and the west were continued down to the 34th Edward III., when John de Beauchamp, lord warden of the Cinque Ports, constable of the Tower of London, and of the Castle of Dover, was constituted *High Admiral of England;* but nine years afterwards the office was again divided into north and west, and so continued until the 10th Richard II., when Richard, son of Alain earl of Arundel, was appointed Admiral of England. Two years after this it was again divided as before; and in the 15th year of the same reign, Edward earl of Rutland and Cork, afterwards duke of Albemarle, was constituted *High Admiral of the North and West;* and after him the marquis of Dorset, and earl of Somerset, son of John of Gaunt, duke of Lancaster; then Percy earl of Winchester next succeeded to the same title, which once more was dropped in the 2d of Henry IV. and divided as before. But in the 6th of the same reign the office of Admiral of England became permanently vested in one person. In the 14th Henry VI. John Holland duke of Exeter was created Admiral of England, Ireland, and Aquitaine for life; and in the third year of Edward VI. John Dudley earl of Warwick was constituted High Admiral of England, Ireland, Wales, Calais, Boulogne, the marches of the same, Normandy, Gascony, and Aquitaine, also Captain-general of the navy and seas of the king, &c. In the 27th Elizabeth, Charles Lord Howard had all the aforesaid titles, with the addition of Captain-general of the navy and seas of the said kingdoms.

On the 20th November 1632, the office of high admiral was for the first time put in commission, all the great officers of state being the commissioners. During the Commonwealth, a committee of parliament managed the affairs of the admiralty. At the Restoration, in 1660, his royal highness James duke of York was constituted *Lord High Admiral of England.* The commission was revoked on the 22d May 1684, and King Charles II. held the admiralty in his own hands, and managed it by the great officers of his privy council until his death. He took this occasion of reserving for his own use all the droits and perquisites claimed by the lord high admiral. King James II. declared himself in council *Lord High Admiral and Lord General;* and he managed the affairs of the admiralty and navy by Mr Secretary Pepys all the time of his reign. In the 1st William and Mary, the admiralty was again put in commission. In the 6th Anne (1707), his royal highness George prince of Denmark was appointed *High Admiral of Great Britain* (in consequence of the union of the two crowns), with a council to assist him; and at his death the queen acted in the office by Mr Burchett. On the 29th November 1708, it was again put in commission, or rather, the earl of Pembroke was constituted High Admiral, with a council to assist him; since which time the office of lord high admiral continued to be executed by lords commissioners of the admiralty, until the 2d of May 1827, when his royal highness the duke of Clarence was appointed *Lord High Admiral,* with a council of four members to assist him; in which office he continued to act, to the great satisfaction of the navy at large, until, at his own request, he was permitted by his Majesty to resign his high office, on the 19th September 1828, when it was again put in commission.

Prince George of Denmark, when lord high admiral, having surrendered, by a formal instrument, all the rights, profits, perquisites, and advantages whatsoever, appertaining to the office, for the benefit and use of the public, with the exception of the sum of L.2500 a year, to be disposed of in such manner, and for such particular uses, as her Majesty, under her sign manual, should direct; the salary of the lord high admiral, which had hitherto been no more than 300 marks, was now fixed, by warrant under privy seal, at L.7000 a year; which sum, by 1st George II. was divided equally among seven commissioners, and continued to be so down to the present time, the part of the commissioner who stood first in the patent having, however, been made up from other funds to L.3000 a year, and, in the year 1806, further increased by Lord Howick, then first lord commissioner, to L.5000 a year. Since the surrender above mentioned, all the *droits of admiralty,* as they are called, with all the fees, emoluments, perquisites, &c. whatsoever, have been taken from the admiral, and applied to public purposes.

These droits and perquisites are by no means inconsiderable. As enumerated in the patent, they consist of flotson, jetson, lagon, treasure, deodands, derelicts, found within his jurisdiction; all goods picked up at sea; all fines, forfeitures, ransoms, recognizances, and pecuniary punishments; all sturgeons, whales, porpusses, dolphins, rigs, and grampusses, and all such large fishes; all ships and goods of the enemy coming into any creek, road, or port, by stress of weather, mistake, or ignorance of the war; all ships seized at sea, salvage, &c. together with his shares of prizes; which shares were afterwards called *tenths,* in imitation probably of the French, who gave their admiral, for supporting the dignity of his office, *son droit de dixième.* All prizes are now wholly given up by the crown to the captors, and such share of the *droits* as from circumstances may be thought proper. The lord high admiral also claimed, and enjoyed as his due, the cast ships; and the subordinate officers of the navy, as their perquisites, all other decayed and unserviceable stores.

Though by act of 2d William and Mary the lords commissioners of the admiralty are vested with all and singular authorities, jurisdictions, and powers, which have been and are vested, settled, and placed in the lord high admiral of England for the time being, to all intents and purposes, as if the said commissioners were lord high admiral of England; yet there is this remarkable difference in the two patents by which they are constituted, that the patent of the lord high admiral mentions very little of the military part of his office, but chiefly details his judicial duties as a magistrate; whilst, on the contrary, the patent to the lords commissioners of the admiralty is very particular in directing them to govern the affairs of the navy, and is almost wholly silent as to their judicial powers.

These powers, as set forth in the patent to the earl of Pembroke in 1701, are, the power to act by deputy; to take cognizance of all causes, civil and maritime, within his jurisdiction; to arrest goods and persons; to preserve public streams, ports, rivers, fresh waters, and creeks whatsoever, within his jurisdiction, as well for the preservation of the ships, as of the fishes; to reform too straight nets, and unlawful engines, and punish offenders; to arrest ships, mariners, pilots, masters, gunners, bombardiers, and any other persons whatsoever, able and fit for the service of the ships, as often as occasion shall require, and wheresoever they shall be met with; to appoint vice-admirals judges, and other officers, *durante beneplacito;* to remove, suspend, or expel them, and put others in their places, as he shall see occasion; to take cognizance of civil and maritime laws, and of death, murder, and maim.

It was by no means necessary that the lord high admiral should be a professional man. Henry VIII. made his natural son, the duke of Richmond, lord high admiral of England, when he was but six years old. When the high admiral, however, went to sea in person, he had usually a commission under the great seal, appointing him Admiral and Captain-general of the fleet, sometimes with powers to confer knighthood, and generally to punish with life and limb. Such a commission was granted by Henry VIII. to Sir Edward Howard, who executed indenture with the king to furnish 3000 men, 18 captains, 1750 soldiers, 1232 mariners and gunners; the pay of himself to be 10s. a day, of a captain 1s. 6d., of the rest 5s. as wages, and 5s. for victuals each man, for twenty-eight days, together with certain dead shares.

It appears, from Mr Pepys's *Naval Collections*, that the lord high admiral did anciently wear, on solemn occasions, a gold whistle, set with precious stones, hanging at the end of a gold chain. The whistle, it would seem, has long since descended to the boatswain and his mates. (M.)

Admiral, *Lord High, of Scotland*, one of the great officers of the crown, and supreme judge in all maritime cases within that part of Britain.

Admiral is also an appellation given to the most considerable ship of a fleet of merchantmen, or of the vessels employed in the cod fishery of Newfoundland. This last has the privilege of choosing what place he pleases on the shore to dry his fish; gives proper orders, and appoints the fishing places to those who come after him; and as long as the fishing season continues, he carries a flag on his main-mast.

Admiral, in *Conchology*, the English name of a species of the *voluta*, a shell-fish belonging to the order of *vermes testacea*.

ADMIRALTY, High Court of. This is a court of law, in which the authority of the lord high admiral is exercised, in his *judicial* capacity, and wherein all causes are determined appertaining to the sea, and all offences tried that are committed thereon. Very little has been left on record of the ancient prerogative of the admirals of England. For some time after the first institution of the office, they judged all matters relating to merchants and mariners, which happened on the main sea, in a summary way, according to the laws of Oleron, promulgated by Richard I. These laws, which were little more than a transcript of the Rhodian laws, became the universally received customs of the western part of the world. "All the sea-faring nations," says Sir Leoline Jenkins, "soon after their promulgation, received and entertained these laws from the English, by way of deference to the sovereignty of our kings in the British ocean, and to the judgment of our countrymen in sea affairs."

In the patents granted to the early admirals between the latter end of the reign of Henry III. and until the close of that of Edward III. no mention is made of marine perquisites or of civil power, nor does it appear that the admirals enjoyed either; but after the death of the latter, new and extraordinary powers were granted to them, and it would appear that they usurped others. The preamble to the statute of 13th Richard II. sets forth, that "forasmuch as a great and common clamour and complaint hath been oftentimes made before this time, and yet is, for that the admirals and their deputies hold their sessions within divers places of this realm, accroaching to them greater authority than belongeth to their office, in prejudice of our lord the king, and in destruction and impoverishing of the common people;" and it is therefore directed that the admirals and their deputies shall not meddle from henceforth of any thing done within the realm, but only of a thing done upon the sea. And two years afterwards, in consequence, as stated in the preamble of the statute, "of the great and grievous complaint of all the commons," it was ordained that the admiral's court should have no cognizance of any contracts, pleas, or quarrels, or of any thing done or arising within the bodies of counties, whether by land or by water, nor of wreck of the sea; but that the admiral should have cognizance of the death of a man, and of maihem done in great ships being and hovering in the main stream of great rivers, yet only beneath the bridges of the same rivers nigh the sea. He may also arrest ships in the great floats for the great voyages of the king and of the realm, and have jurisdiction over the said floats, but during the said voyages only. But if the admiral or his lieutenant exceed that jurisdiction, then, by 2d Henry IV., the statute of 13th Richard II. and common law may be holden against them; and if a man pursues wrongfully in the admiralty court, his adversary may recover double damages at common law, and the pursuant, if attainted, shall incur the penalty of L.10 to the king.

The place which, according to Spelman, is absolutely subject to the jurisdiction of the admiral, is the sea; which, however, comprehends public rivers, fresh waters, creeks, and all places whatsoever, within the ebbing and flowing of the sea, at the highest water, the shores or banks adjoining, from all the first bridges to the seaward; and in these, he observes, the admiralty hath full jurisdiction in all causes, criminal and civil, except treasons and the right of wreck. Lord Coke observes, that "between the high water mark and the low water mark, the admiral hath jurisdiction *super aquam*, when the sea is full, and as long as it flows, though the land be *infra corpus comitatus* at the reflow, so as of one place there is *divisum imperium* at several times."

But though the statute restraineth the lord high admiral, that he shall not hold plea of a thing rising in the body of a county, he is not restrained from making execution upon the land, but is empowered to take either body or goods upon the land; otherwise his jurisdiction would often prove a dead letter. He also can and does hold his court in the body of a county. So, likewise, the civil power may apprehend and try persons who may have been guilty of offences cognizable at common law, though committed in the fleet, in any port or harbour of Great Britain, or at sea, provided such persons have not already been tried for such offences, either by court-martial or in the admiralty court; and in all ports, harbours, creeks, &c. lying in any county, the high admiral and the sheriff, or coroner, as the case may be, have concurrent jurisdiction.

The Lord High Admiral is assisted in his *judicial* functions by the following principal officers:—1. The Vice-admiral; 2. the Judge; 3. the Registrar; 4. the Marshal; 5. Advocate-general; 6. Procurator-general; 7. Counsellor; 8. Solicitor.

1. *The Vice-admiral*. This officer is the admiral's deputy or lieutenant, mentioned in the statutes of 13th and 15th Richard II., and was the person, most probably, who presided in the court. At present the office of vice-admiral of England is a perfect sinecure, generally conferred on some naval officer of high rank and distinguished character in the service, having a salary attached to it in addition to his half-pay of L.469. 5s. 8d. *per annum*. That of rear-admiral of England is the same, and the salary in addition to his half-pay is L.370. 4s. 3d. *per annum*. Each county of England has its vice-admiral, which is little more than an honorary distinction, though the patent gives to him all the powers vested in the admiral himself. Similar powers were also granted to the judges of the admiralty county-courts; but this was found so inconvenient and prejudicial to those who had suits to commence or defend before them, that the duke of York, when lord high admiral, in 1663, caused instructions to be drawn

up in order to ascertain to each his province, whereby the whole judicial power remained with the judge, and the upholding of the rights of the admiral, and levying and receiving the perquisites, &c. appertained to the vice-admiral.

Each of the four provinces of Ireland has its vice-admiral. There is one vice-admiral for all Scotland, who has a salary of L.1000 a year on the ordinary estimate of the navy; and one for the Shetland and Orkney islands. The governor of most of our colonies has a commission of vice-admiral granted to him by the lord high admiral or lords commissioners of the admiralty, and generally a commission from the king, under the great seal, grounded on the 11th and 12th William III., and further confirmed by 46th Geo. III., by which he is authorized to try all piracies, felonies, or robberies committed on the seas, where the parties are taken into custody in places remote from England; the court to consist of seven persons at the least, of whom the governor, the lieutenant-governor, the vice-admiral, the flag-officer, or commander-in-chief of the squadron, the members of the council, the chief justice, judge of the vice-admiralty court, captains of men of war, and secretary of the colony, are specially named in the commission: but any three of these, with four others selected from known merchants, factors, or planters, captains, lieutenants, or warrant-officers of men of war, or captains, masters, or mates of merchant ships, constitute a legal court of piracy.

The vice-admiralty courts in the colonies are of two descriptions. The one has power to inquire into the causes of detention of enemies or neutral vessels, to try and condemn the same for the benefit of the captors, as well as to take cognizance of all matters relating to the office of the lord high admiral. The other has power only to institute inquiries into misdemeanours committed in merchant vessels, and to determine petty suits, &c. and to guard the privileges of the admiral. The former are usually known by the name of *Prize Courts*, the latter by that of *Instance Courts*.

The following are the colonies and foreign possessions in which *Prize Courts* have been established in the course of the last war:—Gibraltar, Malta, Newfoundland, Halifax, Bermuda, Bahama Islands, Barbadoes, Antigua, Tortola, Jamaica, Cape of Good Hope, Ceylon, Bombay, Madras, and Calcutta. The following colonies had *Instance Courts* only:—Dominica, Grenada, St Vincent, St Christopher, Trinidad, St Cervix, Martinique, Berbice, Demerara, and Essequibo; in addition to which is a court established at Sierra Leone for the trial and condemnation of captured slaves only.

In none of the patents to the lord high admiral, vice-admiral, or judge, is any mention made of prize jurisdiction. Lord Mansfield had occasion to search into the records of the court of admiralty in Doctors' Commons, to ascertain on what foundation this jurisdiction was exercised by the judge of the admiralty; but he could not discover any prize-act books farther back than 1643; no sentences farther back than 1648. The registrar could go no farther back than 1690. "The prior records," says his lordship, "are in confusion, illegible, and without index." The prize jurisdiction may therefore be considered as of modern authority, and distinct altogether from the ancient powers given to the admiral. To constitute the authority for trying prize causes, a commission under the great seal issues to the lord high admiral, at the commencement of every war, to will and require the court of admiralty, and the lieutenant and judge of the said court, his surrogate or surrogates, to proceed upon all manner of captures, seizures, prizes, and reprisals, of all ships and goods that are or shall be taken; and to hear and determine according to the course of the admiralty, or the law of nations; and a warrant issues to the judge of the admiralty accordingly.

The admiralty court being in this respect a court in which foreigners of all nations may become suitors, an appeal may be had from its decisions to a committee of the lords of his Majesty's privy council, who hear and determine according to the established laws of nations.

At the breaking out of a war, the lord high admiral also receives a special commission from the crown, under the great seal, to empower him to grant letters of marque and reprisals against the enemy, he having no such power by his patent. These letters are either general or special; general, when granted to private men to fit out ships at their own charge to annoy the enemy; special, when in the case of any of our merchants being robbed of their estates or property by foreigners, the king grants them letters of reprisal against that nation, though we may be in amity with it. Before the latter can be sued for, the complainant must have gone through the prosecution of his suit in the courts of the state whose subjects have wronged him; where, if justice be denied or vexatiously delayed, he must first make proof of his losses and charges in the admiralty court here; whereupon, if the king is satisfied he has pursued all lawful means to obtain redress, and his own interceding should produce no better effect, special letters of reprisal are granted; not, however, as must be evident, until a very strong case has been made out. This custom, which we may now consider as obsolete, seems to be a remnant of the law of ancient Greece, called *androlepsia*, by which, if a man was slain, the friends and relations of the deceased might seize on any three citizens of the place where the murderer took refuge, and make them slaves, unless he was delivered up. Both Oliver Cromwell and King Charles II. granted letters of reprisal. In 1638 the Duc d'Epernon seized on the ship Amity of London, for the service of the French king against the Spaniards, promising full satisfaction; but none being made, the owners obtained letters of reprisal from the usurper, and afterwards, in 1665, from Charles II. In 1666 Captain Butler Barnes had letters of reprisal against the Danes. The Dutch having burnt six English merchant vessels in the Elbe, within the territories of Hamburg, which city, instead of giving any assistance or protection, hindered the English from defending themselves, letters of reprisal were granted to the sufferers against that city. Lastly, one Justiniani, a noble Genoese, being indebted in a great sum to Joseph Como, a merchant in London, which he had several years solicited for, but could get no satisfaction, Captain Scott, commander of his Majesty's ship the Dragon, stationed at that time in the Mediterranean, received orders to make reprisals upon the ships of that republic; upon which the debt was paid.

2. *The Judge.* The patents to the judge of the admiralty and vice-admiralty courts run pretty nearly in the same manner as those of the lord high admiral, and point out the several matters of which he can take cognizance. The parliament of 1640 established the office of judge of the admiralty court in three persons, with a salary of L.500 a year to each. At the Restoration there were two judges of the high court of admiralty, which sometimes proved inconvenient; for when they differed in opinion no judgment could be had. These judges, before the Revolution, held their appointment only during pleasure. At that period Sir Charles Hedges was constituted judge under the great seal of England, *quamdiu se bene gesserit*, with a salary of L.400 a year, and

an additional L.400 out of the proceeds of prizes and perquisites of the admiralty; but in the year 1725 the latter sum was diminished from the ordinary estimate by the House of Commons. Lord Stowell, the late judge, in consequence of the extraordinary increase of the business in the admiralty court, had a salary of L.2500 a year on the ordinary estimate of the navy.

The judges of the vice-admiralty courts in certain of the colonies, limited by 41st George III., are allowed a salary not exceeding to each the sum of L.2000 a year, to be paid out of the consolidated fund of Great Britain; together with profits and emoluments not exceeding to each the further sum of L.2000 *per annum*, out of the fees to be taken by the said judges, of which a table is directed to be hung up in some conspicuous place in the court; and no judge is to take any fee beyond those specified, directly or indirectly, on pain of forfeiture of his office, and being proceeded against for extortion; and on his retirement from office, after six years' service, his Majesty may, by authority of the act above mentioned, grant unto such judge an annuity for the term of his life, not exceeding L.1000 *per annum*. This liberal provision puts the judges of the colonial courts of vice-admiralty above all suspicion of their decisions being influenced by unworthy motives; a suspicion they were not entirely free from when their emoluments depended mainly on their fees.

During the late war, a session of oyer and terminer to try admiralty causes was held at the Old Bailey twice a year. The commission for this purpose is of the same nature with those which are granted to the judges when they go the circuits; that is to say, to determine and punish all crimes, offences, misdemeanours, and abuses; the *end* of both being the same, their *limits* different; the one relating to things done upon the land, the other to things done upon the water. The lords commissioners of the admiralty, all the members of the privy council, the chancellor and all the judges, the lords of the treasury, the secretary of the admiralty, the treasurer and commissioners of the navy, some of the aldermen of London, and several doctors of the civil law, are the members of this commission; any four of whom make a court, the quorum being the lords of the admiralty, judge of the admiralty, the twelve judges, and the doctors of the civil law.

The session of oyer and terminer lasts generally from one to three days, and the court is entertained each day with a dinner at the expense of the lord high admiral, that is to say, of the public.

The proceedings of the court are continued *de die in diem*, or, as the style of the court is, from tide to tide.

3. *The Registrar of the Admiralty* has hitherto held his place by patent from the lord high admiral generally for life, though the admiral himself and the lords commissioners of admiralty hold their places only during pleasure; and, what is still more remarkable, the office of registrar has sometimes been granted, and is now vested in reversion. He had no salary, the amount of his emoluments depending on the number of captures, droits, &c. condemned by the court; which, during the late war, were so enormous, that in 1810 an act was passed for regulating the offices of registrars of admiralty and prize courts, by which it is enacted, "that no office of registrar of the high court of admiralty, or of the high court of appeals for prizes, or high court of delegates in Great Britain, shall, after the expiration of the interest now vested in possession or reversion therein, be granted for a longer term than during pleasure, nor be executed by deputy; that an account be kept in the said offices respectively of all the fees, dues, perquisites, emoluments, and profits received by and on account of the said registrars, out of which all the expenses of their offices are to be paid; that one-third of the surplus shall belong to the registrar and to his assistant (if an assistant should be necessary), and the remaining two-thirds to the consolidated fund of Great Britain, to be paid quarterly into the exchequer; the account of such surplus to be presented to the court at least fourteen days before each quarter day, and verified on oath.

4. *The Marshal.* This officer receives his appointment from the lord high admiral or lords commissioners of the admiralty, and holds his situation by patent under the seal of the high court of admiralty during pleasure. His duties are, to arrest ships and persons, to imprison in the Marshalsea, to bear the mace before the judge, and to attend executions. His emoluments depend chiefly on the number of prizes brought into port for condemnation, and the number of ships embargoed, and may probably be reckoned in time of war, *communibus annis*, from L.1500 to L.2000 a year, out of which he has to pay about L.400 a year to a deputy. In peace, the whole emoluments are probably not sufficient for the payment of the deputy's salary.

5. *The Advocate-general.* This officer is appointed by warrant of the lords commissioners of the admiralty. His duties are, to appear for the lord high admiral in his court of admiralty, court of delegates, and other courts; to move and debate in all causes wherein the rights of the admiral are concerned; for which he had anciently a salary of twenty marks a year, and an additional allowance, granted to him in 1695, of L.200 a year. At present he has L.213. 6s. 8d. a year, voted on the ordinary estimate of the navy. Formerly the admiral's advocate was always retained as leading counsel, but since the droits were transferred to the crown, he has gradually been supplanted by the king's advocate, who is generally retained in all cases, the admiralty advocate acting only as junior counsel; and while the former makes sometimes from L.15,000 to L.20,000 a year, the latter rarely receives from his professional duties more than from L.1500 to L.2000 a year. This difference, however, may probably be owing in a great degree to the personal character of the men who hold the two situations.

6. *The Procurator.* The admiralty's proctor stands precisely in the same situation to the king's proctor that his advocate does to that of the king, though there is not quite so great a difference in their emoluments. They act as the attorneys or solicitors in all causes concerning the king's and the lord high admiral's affairs in the high court of admiralty and other courts. All prize causes are conducted by the king's proctor, which the captors are disposed to consider as a grievance, but which the gentlemen of Doctors Commons, on the contrary, maintain to be for their convenience and advantage. It is supposed that in some years of the war the king's proctor did not receive less than L.20,000 a year.

7. *The Counsel of the Admiralty* is the law officer who is chiefly consulted on matters connected with the military duties of the lord high admiral; his salary is L.100 a year, besides his fees, which in time of war may be reckoned to amount to from L.1200 to L.1800 a year.

8. *The Solicitor to the Admiralty* is also an officer more immediately connected with the military functions of the admiralty. He is styled sometimes assistant to the counsel: his salary is L.1500 a year, in lieu of all fees, bills, and disbursements.

The Judge Advocate of the fleet is a sinecure appointment, with a salary of L.182. 10s. a year, on the ordinary estimate of the navy; but the *Deputy Judge Advocate* resides at Portsmouth, and assists at all courts-martial held at that port, for which he is allowed an annual salary of L.146. See NAVY. (M.)

ADMIRALTY Bay, a spacious bay, with good anchorage, on the west coast of Cook's straits, in the southern island of New Zealand. Long. 174. 54. E. Lat. 40. 37. S.—There is a bay of the same name on the north-west coast of America, in Long. 140. 81. W. Lat. 59. 31. N.

ADMIRALTY Inlet, the entrance to the supposed straits of Juan de Fuca, on the west coast of New Georgia, in Long. 124. 15. W. Lat. 48. 30. N. It was visited by Captain Vancouver in 1792, who found the soil on the shores rich and fertile, well watered, and clothed with luxuriant vegetation.

ADMIRALTY Islands lie in about Long. 146. 44. E. and Lat. 2. 18. S. There are between 20 and 30 islands said to be scattered about here, one of which alone would make a large kingdom. Captain Carteret, who first discovered them, was prevented from touching at them, although their appearance was very inviting, on account of the condition of his ship, and his being entirely unprovided with the articles of barter which suit an Indian trade. He describes them as clothed with a beautiful verdure of woods, lofty and luxuriant, interspersed with spots that have been cleared for plantations, groves of cocoa-nut trees, and houses of the natives, who seem to be very numerous. The largest of these islands is 18 leagues long in the direction of east and west. The discoverer thinks it highly probable that these islands produce several valuable articles of trade, particularly spices, as they lie in the same climate and latitude as the Moluccas.

ADMONITION, in ecclesiastical affairs, a part of discipline much used in the ancient church. It was the first act or step towards the punishment or expulsion of delinquents. In private offences it was performed, according to the evangelical rule, privately; in case of public offence, openly, before the church. If either of these sufficed for the recovery of the fallen person, all further proceedings in the way of censure ceased: if they did not, recourse was had to excommunication.

ADMONITIO Fustium, a military punishment among the Romans, not unlike our whipping, but it was performed with vine branches.

ADMONT, a town in the Austrian duchy of Steyermark, in the circle of Judenburg. In a Benedictine abbey is an establishment for education, with a director, six professors, and a library. There are some iron goods made, the metal for which is furnished by mines in the vicinity. The inhabitants were 824 in 1817.

ADNATA, in *Anatomy*, one of the coats of the eye, which is called also *conjunctiva* and *albuginea*.

ADNATA is also used for any hair, wool, or the like, which grows upon animals or vegetables.

ADNATA, or *Adnascentia*, among gardeners, denote those offsets which, by a new germination under the earth, proceed from the lily, narcissus, hyacinth, and other flowers, and afterwards become true roots.

ADNOUN is used by some grammarians to express what we more usually call an adjective. The word is formed by way of analogy to adverb, in regard adjectives have much the same office and relation to nouns that adverbs have to verbs. Bishop Wilkins uses the word *adname* in another sense, viz. for what we otherwise call a preposition.

ADOLESCENCE, the state of growing youth, or that period of a person's age commencing from his infancy and terminating at his full stature or manhood. The word is formed of the Latin *adolescere*, to grow. The state of adolescence lasts so long as the fibres continue to grow either in magnitude or firmness. The fibres being arrived at the degree of firmness and tension sufficient to sustain the parts, no longer yield or give way to the efforts of the nutritious matter to extend them; so that their further accretion is stopped, from the very law of their nutrition. Adolescence is commonly computed to be between 15 and 25, or even 30 years of age; though in different constitutions its terms are very different. The Romans usually reckoned it from 12 to 25 in boys, and to 21 in girls, &c. And yet, among their writers, *juvenis* and *adolescens* are frequently used indifferently for any person under 45 years.

ADOLLAM, or ODOLLAM, a town in the tribe of Judah, to the east of Eleutheropolis. David is said to have hid himself in a cave near this town.

ADOM, a state or principality of the Gold Coast, in Africa. It is a populous, rich, and fertile country, abounding with corn and fruits.

ADON, a populous village in the province of Stuhl-Weissenburg, belonging to Hungary. It lies in a fruitful country, towards the river Danube. Long. 19. 20. E. Lat. 47. 30. N.

ADONAI, one of the names of the Supreme Being in the Scriptures. The proper meaning of the word is *my lords* in the plural number, as *Adoni* is *my lord* in the singular. The Jews, who, either out of respect or superstition, do not pronounce the name of *Jehovah*, read *Adonai* in the room of it as often as they meet with Jehovah in the Hebrew text. But the ancient Jews were not so scrupulous; nor is there any law which forbids them to pronounce the name of God.

ADONIA, in *Antiquity*, solemn feasts in honour of Venus, and in memory of her beloved Adonis. The Adonia were observed with great solemnity by the Greeks, Phœnicians, Lycians, Syrians, Egyptians, &c. From Syria they are supposed to have passed into India. The prophet Ezekiel[1] is understood to speak of them. They were still observed at Alexandria in the time of St Cyril, and at Antioch in that of Julian the Apostate, who happened to enter that city during the solemnity, which was taken for an ill omen. The Adonia lasted two days; on the first of which certain images of Venus and Adonis were carried, with all the pomp and ceremonies practised at funerals: the women wept, tore their hair, beat their breasts, &c. imitating the cries and lamentations of Venus for the death of her paramour. This lamentation they called Αδωνιασμος. The Syrians were not contented with weeping, but subjected themselves to severe discipline, shaved their heads, &c. The Egyptian Adonia are said to have been held in memory of the death of Osiris; by others, of his sickness and recovery. Bishop Patrick dates their origin from the slaughter of the first-born under Moses.

ADONIDES, in *Botany*, a name given to botanists who described or made catalogues of plants cultivated in any particular place.

ADONIS, son of Cinyras, king of Cyprus, the favourite of Venus. Being killed by a wild boar in the Idalian woods, he was turned into a flower of a blood-colour, supposed to be the anemone. Venus was inconsolable; and no grief was ever more celebrated than this, most nations having perpetuated the memory of it by a train of anniversary ceremonies.[2] The text of the Vulgate, in Ezekiel viii. 14, says that this prophet saw women sitting in the temple and weeping for Adonis; but according to the reading of the Hebrew text, they are said to weep for Thammuz, or *the hidden one*. Among the Egyptians, Adonis was adored under the name of Osiris, the husband

[1] Ch. viii. 14.

[2] See ADONIA.

of Isis. But he was sometimes called by the name of Ammuz, or Thammuz, *the concealed*, to denote probably his death or burial. The Hebrews, in derision, call him sometimes *the dead*, Psal. cvi. 28. and Lev. xix. 28. because they wept for him, and represented him as one dead in his coffin; and at other times they call him the *image of jealousy*, Ezek. viii. 3. 5. because he was the object of the god Mars' jealousy. The Syrians, Phœnicians, and Cyprians, called him Adonis; and F. Calmet is of opinion that the Ammonites and Moabites gave him the name of Baal-peor.

Adonis, *Adonius*, in *Ancient Geography*, a river of Phœnicia, rising in Mount Lebanon, and falling into the sea, after a north-west course, at Byblus: famous in fable as a beautiful shepherd youth loved by Venus, slain by a boar, and turned into a river.

Adonis, in *Botany*, *Bird's Eye*, or *Pheasant's Eye*.

ADONISTS, a sect or party among divines and critics, who maintain that the Hebrew points ordinarily annexed to the consonants of the word Jehovah are not the natural points belonging to that word, nor express the true pronunciation of it, but are the vowel points belonging to the words *Adonai* and *Elohim*, applied to the consonants of the ineffable name Jehovah, to warn the readers, that instead of the word Jehovah, which the Jews were forbidden to pronounce, and the true pronunciation of which had been long unknown to them, they are always to read *Adonai*. They are opposed to *Jehovists*; of whom the principal are Drusius, Capellus, Buxtorf, Alting, and Reland, who has published a collection of their writings on this subject.

ADOPTIANI, in *Church History*, a sect of ancient heretics, followers of Felix of Urgel and Elipand of Toledo, who, towards the end of the eighth century, advanced the notion that Jesus Christ in his human nature is the Son of God, not by nature, but by adoption.

ADOPTION, an act by which any one takes another into his family, owns him for his son, and appoints him for his heir.

The custom of adoption was very common among the ancient Greeks and Romans; yet it was not practised but for certain causes expressed in the laws, and with certain formalities usual in such cases. It was a sort of imitation of nature, intended for the comfort of those who had no children: wherefore, he that was to adopt was to have no children of his own, and to be past the age of getting any; nor were eunuchs allowed to adopt, as being under an actual impotency of begetting children: neither was it lawful for a young man to adopt an elder, because that would have been contrary to the order of nature; nay, it was even required that the person who adopted should be eighteen years older than his adopted son, that there might at least appear a probability of his being the natural father.

Among the Greeks it was called *υιοτης*, *filiation*. It was allowed to such as had no issue of their own, excepting those who were not *κυριοι εαυτων*, *their own masters*, *e. g.* slaves, women, madmen, infants, or persons under twenty years of age; who being incapable of making wills, or managing their own estates, were not allowed to adopt heirs to them. Foreigners being incapable of inheriting at Athens, if any such were adopted, it was necessary first to make them free of the city. The ceremony of adoption being over, the adopted had his name enrolled in the tribe and ward of his new father; for which entry a peculiar time was allotted, viz. the festival *Θαργηλια*. To prevent rash and inconsiderate adoptions, the Lacedemonians had a law, that adoptions should be transacted, or at least confirmed, in the presence of their kings. The children adopted were invested with all the privileges, and obliged to perform all the duties, of natural children; and being thus provided for in another family, ceased to have any claim of inheritance or kindred in the family which they had left, unless they first renounced their adoption, which by the laws of Solon they were not allowed to do, unless they had first begotten children to bear the name of the person who had adopted them; thus providing against the ruin of the families, which would otherwise have been extinguished by the desertion of those who had been adopted to preserve them. If the children adopted happened to die without children, the inheritance could not be alienated from the family into which they had been adopted, but returned to the relations of the adopter. It should seem that, by the Athenian law, a person, after having adopted another, was not allowed to marry without permission from the magistrate; and there are instances of persons who, being ill used by their adoptive children, petitioned for such leave. However this may be, it is certain that some men married after they had adopted sons; in which case, if they begat legitimate children, their estates were equally shared between the begotten and the adopted.

The Romans had two forms of adoption; the one before the pretor, the other at an assembly of the people, in the times of the commonwealth, and afterwards by a rescript from the emperor. In the former, the natural father addressed himself to the pretor, declaring that he emancipated his son, resigned all his authority over him, and consented that he should be translated into the family of the adopter. The latter was practised where the party to be adopted was already free; and this was called *adrogation*. The person adopted changed all his names, assuming the prename, name, and surname, of the person who adopted him.

Besides the formalities prescribed by the Roman law, various other methods have taken place, which have given denominations to different species of adoption among the Gothic nations, in different ages. Thus,

Adoption by Arms was when a prince made a present of arms to a person, in consideration of his merit and valour. The obligation here laid on the adoptive son was to protect and defend the father from injuries, affronts, &c. And hence, according to Selden, the ceremony of dubbing knights took its origin as well as name.

Adoption by Baptism is that spiritual affinity which is contracted by godfathers and godchildren in the ceremony of baptism. This kind of adoption was introduced into the Greek church, and came afterwards into use among the ancient Franks, as appears by the capitulars of Charlemagne.

Adoption by Hair was performed by cutting off the hair of a person, and giving it to the adoptive father. It was thus that Pope John VIII. adopted Boson, king of Arles, which perhaps is the only instance in history of adoption in the order of the ecclesiastics: a law that professes to imitate nature, not daring to give children to those in whom it would be thought a crime to beget any.

Adoption by Matrimony is the taking of the children of a wife or husband by a former marriage into the condition of proper or natural children, and admitting them to inherit on the same footing with those of the present marriage.

Adoption by Testament, that performed by appointing a person heir by will, on condition of his assuming the name, arms, &c. of the adopter; of which kind we meet with several instances in the Roman history. Among the Turks, the ceremony of adoption is performed by obliging the person adopted to pass through the shirt of the adopter. Hence, among that people, to adopt is expressed by the phrase, *to draw another through my shirt.* It is said that something like this has also been observed among the Hebrews, where the prophet Elijah adopted Elisha for his son and successor, and communicated to him the gift of prophecy, by letting fall his cloak or mantle on him. But adoption, properly so called, does not appear to have been practised among the ancient Jews. Moses says nothing of it in his laws; and Jacob's adoption of his two grandsons, Ephraim and Manasseh, is not so properly an adoption as a kind of substitution, whereby those two sons of Joseph were allotted an equal portion in Israel with his own sons.

ADOPTIVE denotes a person or thing adopted by another. Adoptive children, among the Romans, were on the same footing with natural ones, and accordingly were either to be instituted heirs or expressly disinherited, otherwise the testament was null. The emperor Adrian preferred adoptive children to natural ones; because we choose the former, but are obliged to take the latter at random.—M. Menage has published a book of eloges or verses addressed to him, which he calls *Liber Adoptivus*, an adoptive book, and adds it to his other works. Heinsius, and Furstemberg of Munster, have likewise published adoptive books.—In ecclesiastical writers we find adoptive women or sisters (*adoptivæ fœminæ* or *sorores*) used for those handmaids of the ancient clergy, otherwise called *sub-introductæ.*

Adoptive Arms are those which a person enjoys by the gift or concession of another, and to which he was not otherwise entitled. They stand contradistinguished from arms of alliance.—We sometimes meet with adoptive *heir* by way of opposition to natural heir, and adoptive *gods* by way of contradistinction to domestic ones. The Romans, notwithstanding the number of their domestic, had their adoptive gods, taken chiefly from the Egyptians: such were Isis, Osiris, Anubis, Apis, Harpocrates, and Canopus.

ADORATION, the act of rendering divine honours, or of addressing a being, as supposing it a god. The word is compounded of *ad*, to, and *os, oris*, mouth; and literally signifies to apply the hand to the mouth; *manum ad os admovere*, to kiss the hand; this being in the eastern countries one of the great marks of respect and submission.—The Romans practised adoration at sacrifices and other solemnities; in passing by temples, altars, groves, &c.; at the sight of statues, images, or the like, whether of stone or wood, wherein any thing of divinity was supposed to reside. Usually there were images of the gods placed at the gates of cities, for those who went in or out to pay their respects to. The ceremony of adoration among the ancient Romans was thus:—The devotee, having his head *covered*, applied his right hand to his lips, the fore finger resting on his thumb, which was erect, and thus bowing his head, turned himself round from left to right. The kiss thus given was called *osculum labratum*; for ordinarily they were afraid to touch the images of their gods themselves with their profane lips. Sometimes, however, they would kiss their feet, or even knees, it being held an incivility to touch their mouths; so that the affair passed at some distance. Saturn, however, and Hercules were adored with the head *bare*; whence the worship of the last was called *institutum peregrinum*, and *ritus Græcanicus*, as departing from the customary Roman method, which was to sacrifice and adore with the face veiled, and the clothes drawn up to the ears, to prevent any interruption in the ceremony by the sight of unlucky objects.—The Jewish manner of adoration was by prostration, bowing, and kneeling. The Christians adopted the Grecian rather than the Roman method, and adored always *uncovered*. The ordinary posture of the ancient Christians was kneeling, but on Sundays standing; and they had a peculiar regard to the east, to which point they ordinarily directed their prayers.

ADORATION is also used for certain extraordinary *civil honours* or respects which resemble those paid to the Deity, yet are given to men.

The Persian manner of adoration, introduced by Cyrus, was by bending the knee and falling on the face at the prince's feet, striking the earth with the forehead, and kissing the ground. This ceremony, which the Greeks called *προσκυνησιν*, Conon refused to perform to Artaxerxes, and Calisthenes to Alexander the Great, as reputing it impious and unlawful.

The adoration performed to the Roman and Grecian emperors consisted in bowing or kneeling at the prince's feet, laying hold of his purple robe, and presently withdrawing the hand and clapping it to the lips. Some attribute the origin of this practice to Constantius. It was only persons of some rank or dignity that were entitled to the honour. Bare kneeling before the emperor to deliver a petition was also called *adoration*.

The practice of adoration may be said to be still subsisting in England, in the ceremony of kissing the king's or queen's hand, and in serving them at table, both being performed kneeling.

ADORATION is also used among Roman writers for a high species of *applause* given to persons who had spoken or performed well in public. See ACCLAMATION. We meet with adoration paid to orators, actors, musicians, &c. The method of expressing it was, by rising, putting both hands to their mouth, and then returning them towards the person intended to be honoured.

ADORATION is also used in the court of Rome for the ceremony of *kissing the pope's feet.* It is said of Dioclesian, that he had gems fastened to his shoes, that divine honours might be more willingly paid him, by kissing his feet. The like usage was afterwards adopted by the popes, and is observed to this day. These prelates, finding a vehement disposition in the people to fall down before them and kiss their feet, procured crucifixes to be fastened on their slippers; by which stratagem the adoration intended for the pope's person is supposed to be transferred to Christ.

ADORATION is also used for a method of *electing a pope.* The election of popes is performed two ways; by *adoration* and by *scrutiny*. In election by adoration, the cardinals rush hastily, as if agitated by some spirit, to the adoration of some one among them, to proclaim him pope. When the election is carried by scrutiny, they do not adore the new pope till he is placed on the altar.

Barbarous ADORATION is a term used, in the laws of King Canute, for that performed after the manner of the heathens, who adored idols. The Romish church is charged with the adoration of saints, martyrs, images, crucifixes, relics, the virgin, and the host; all which by Protestants are generally aggravated into idolatry, on a supposition that the honour thus paid to them is absolute and supreme, called by way of distinction *Latria*, which is due only to God. The Roman Catholics, on the contrary, explain them as only a relative or subordinate worship, called *Dulia* and *Hyperdulia*, which terminates ultimately in God alone. But may not the same be said of the idol worship of the heathens? The Phœnicians adored the winds, on account of the terrible effects produced by them: the same was adopted by most of the other nations, Persians, Greeks, Romans, &c. The Persians chiefly paid their adorations to the sun and fire; some say also to rivers, the wind, &c. The motive of adoring the sun was the benefits they received from that glorious luminary, which of all creatures has doubtless the best pretensions to such homage.

ADOREA, in *Roman Antiquity*, a word used in different senses: sometimes for all manner of grain; sometimes for a kind of cakes made of fine flour, and offered in sacrifice; and, finally, for a dole or distribution of corn, as a reward for some service; whence by metonymy it is put for praise or rewards in general.

ADOSCULATION, a term used by Dr Grew to imply a kind of impregnation without intromission; and in this manner he supposes the impregnation of plants is effected, by the falling of the farina fœcundans on the pistil.

ADOSSEE, in *Heraldry*, signifies two figures or bearings being placed back to back.

ADOUR, the name of a river of France, which rises in the mountains of Bigorre, in the department of the Upper Pyrenees, and running north by Tarbes through Gascony, afterwards turns east, and passing by Dax, falls into the Bay of Biscay below Bayonne.

ADOWA, the capital of Tigré in Abyssinia, is situated on the declivity of a hill, on the west side of a small plain, which is surrounded on every side by mountains. The name, signifying *pass* or *passage*, is characteristic of its situation; for the only road from the Red Sea to Gondar passes by Adowa. The town consists of 300 houses, is the residence of the governor, and has a manufactory of coarse cotton cloth, which circulates in Abyssinia as the medium of exchange in place of money. Long. 38. 50. E. Lat. 14. 7. N.

ADOXA, in *Botany*, TUBEROUS MOSCHATEL, HOLLOW-ROOT, or INGLORIOUS.

ADRA, a seaport town of the province of Granada, in Spain, 47 miles south-east of Granada. Long. 2. 37. E. Lat. 36. 42. N.

ADRACHNE, in *Botany*, a species of the strawberry tree.

ADRAMMELECH, one of the gods of the inhabitants of Sepharvaim, who were settled in the country of Samaria in the room of those Israelites who were carried beyond the Euphrates. The Sepharvaites made their children pass through the fire in honour of this idol and another called *Anammelech*. It is supposed that Adrammelech meant the sun, and Anammelech the moon: the first signifies the *magnificent king*, the second the *gentle king*.

ADRAMYTTIUM, in *Ancient Geography*, now *Adramiti*, a town of Mysia, at the foot of Mount Ida, an Athenian colony, with a harbour and dock.

ADRASTEA, in *Mythology*, was the daughter of Jupiter and Necessity, and, according to Plutarch, the only fury who executed the vengeance of the gods. The name is derived from King Adrastus, who first erected a temple to that deity.

ADRASTEA Certamina, in *Antiquity*, a kind of Pythian games instituted by Adrastus, king of Argos, in the year of the world 2700, in honour of Apollo, at Sicyon. These are to be distinguished from the Pythian games celebrated at Delphi.

ADRASTUS, in *Ancient History*, king of Argos, son of Talaus and Lysianassa, daughter of Polybius, king of Sicyon, acquired great honour in the famous war of Thebes, in support of Polynices his son-in-law, who had been excluded the sovereignty of Thebes by Eteocles his brother, notwithstanding their reciprocal agreement. Adrastus, followed by Polynices, and Tydeus his other son-in-law, by Capaneus and Hippomedon his sister's sons, by Amphiaraus his brother-in-law, and by Parthenopæus, marched against the city of Thebes; and this is the expedition of the *Seven Worthies*, which the poets have so often sung. They all lost their lives in this war except Adrastus, who was saved by his horse called *Arion*. This war was revived ten years after by the sons of those deceased warriors, which was called the *war of the Epigones*, and ended with the taking of Thebes. None of them lost their lives except Ægialeus, son of Adrastus; which afflicted him so much that he died of grief in Megara, as he was leading back his victorious army.

ADRAZZO, or AJACCIO, the same with ADJAZZO.

ADRIA, a city of Italy, in the Austria-Venetian province of Bovigio. It is a city of high antiquity, and gave its name to the sea on whose shores it is built. From its situation on a peninsula formed by the rivers Po and Tartaro, it is very unhealthy. The inhabitants are 9620. The chief trade is that of tanning leather. Long. 12. 2. E. Lat. 45. 2. N.

ADRIAN, or HADRIAN, PUBLIUS ÆLIUS, the Roman emperor. He was born at Rome on the 24th of January, in the 76th year of Christ, A. U. C. 829. His father left him an orphan, at ten years of age, under the guardianship of Trajan, and Cœlius Tatianus, a Roman knight. He began to serve very early in the armies, having been tribune of a legion before the death of Domitian. He was the person chosen by the army of Lower Mœsia to carry the news of Nerva's death to Trajan, successor to the empire. Trajan, however, conceived some prejudices against him; and Adrian, perceiving that he was no favourite with the emperor, endeavoured to ingratiate himself with the empress Plotina, by which means he succeeded in obtaining for his wife Sabina, the emperor's grand-niece and next heiress. This was probably the first step to his future advancement, and facilitated his ascent to the throne. As questor he accompanied Trajan in most of his expeditions, and particularly distinguished himself in the second war against the Dacians. Afterwards he was successively tribune of the people, pretor, governor of Pannonia, and consul. After the siege of Atra in Arabia was raised, Trajan, who had already given him the government of Syria, left him the command of the army; and at length, when he found death approaching, it is said he adopted him. Adrian, who was then in Antiochia, as soon as he received the news thereof, and of Trajan's death, declared himself emperor, on the 11th August, A. D. 117.

No sooner had he arrived at the imperial dignity than he made peace with the Persians, to whom he yielded up great part of the conquests of his predecessors; and from generosity or policy he remitted the debts of the Roman people, which, according to the calculation of those who have reduced them to modern money, amounted to 22,500,000 golden crowns; and he burnt all the bonds and obligations relating to those debts, that the people might be under no apprehension of being called to an account for them afterwards. There are medals in commemoration of this fact, in which he is represented holding a flambeau in his hand, to set fire to all those bonds which he had made void. He went to visit all the provinces, and did not return to Rome till the year 118, when the senate decreed him a triumph, and honoured him with the title of *Father of his Country*; but he refused both, and desired that Trajan's image might triumph. No prince travelled more than Adrian, there being hardly one province in the empire which he did not visit. In 120 he went into Gaul; from thence he went over to Britain, in order to subdue the Caledonians, who were making continual inroads into the provinces. Upon his arrival they retired towards the north. He advanced, however, as far as York, where he was diverted from his intended conquest by the description there given him of the country by some old soldiers who had served under Agricola. In hopes, therefore, of keeping them quiet by enlarging their bounds, he delivered up to the Caledonians all the lands lying between the two friths and the Tyne; and at the same time, to secure the Roman province from their future incursions, built the famous wall which still bears his name.[1] Having thus settled matters in Britain, he returned to Rome, where he was honoured with the title of *Restorer of Britain*, as appears by some medals. He soon after went into Spain, to Mauritania, and at length into the East, where he quieted the commotions raised by the Parthians. After having visited all the provinces of Asia, he returned to Athens in 125, where he passed the winter, and was initiated in the mysteries of Eleusinian Ceres. He went from thence to Sicily, chiefly to view Mount Ætna, contemplate its phenomena, and enjoy the beautiful and extensive prospect afforded from its top. He returned to Rome in the beginning of the year 129; and, according to some, he went again the same year to Africa; and, after his return from thence, to the East. He was in Egypt in the year 132, revisited Syria the year following, returned to Athens in 134, and to Rome in 135. The persecution against the Christians was very violent under his reign; but it was at length suspended, in consequence of the remonstrances of Quadratus, bishop of Athens, and Aristides, two Christian philosophers, who presented the emperor with some books in favour of the Christian religion. He conquered the Jews, and by way of insult erected a temple to Jupiter on Calvary, and placed a statue of Adonis in the manger of Bethlehem: he caused also the images of swine to be engraven on the gates of Jerusalem. At last he was seized with a dropsy, which vexed him to such a degree that he became almost raving mad. A great number of physicians were sent for, and to the multitude of them he ascribed his death. He died at Baiæ in the 63d year of his age, having reigned 21 years. The Latin verses he addressed to his soul, which he composed a short time before his death, in a strain of tender levity, have been much criticised, and have been the subject of numerous translations and imitations.

Animula vagula, blandula,
Hospes, comesque corporis,
Quæ nunc abibis in loca
Pallidula, rigida, nudula,
Nec, ut soles, dabis jocos?

Ah! fleeting spirit! wand'ring fire,
That long hast warm'd my tender breast,
Must thou no more this frame inspire?
No more a pleasing cheerful guest?
Whither, ah whither art thou flying?
To what dark undiscover'd shore?
Thou seem'st all trembling, shiv'ring, dying,
And wit and humour are no more! POPE.

Some fragments of his Latin poetry are still extant, and there are Greek verses of his in the Anthology. He also wrote the history of his own life; to which, however, he did not choose to put his name; but that of Phlegon, one of his freedmen, a very learned person, was prefixed to it.[2] He had great wit and a retentive memory, and he distinguished himself in the various branches of literature and science. In his natural disposition he was suspicious, envious, cruel, and lascivious. In his character there was a strange composition of virtues and vices. He was affable, courteous, and liberal; but he was capricious and unsteady in his attachments, and violent in his resentment. Thus he was distrusted by his friends, and dreaded by his enemies. Antoninus his successor obtained his apotheosis, and prevented the rescission of his acts, which the senate once intended.

ADRIAN I. *Pope*, ascended the papal throne A. D. 772. He was the son of Theodore, a Roman nobleman, and possessed considerable talents for business. He maintained a steady attachment to Charlemagne, which provoked Desiderius, a king of the Lombards, to invade the state of Ravenna, and to threaten Rome itself. Charlemagne rewarded his attachment by marching with a great army to his aid; and having gained many considerable advantages over Desiderius, he visited the pope at Rome, and expressed his piety by the humiliating ceremony of kissing each of the steps as he ascended to the church of St Peter. The affairs of the church now claimed Adrian's particular attention; for Irene, who in 780 assumed the regency at Constantinople during the minority of her son Constantine, wishing to restore the worship of images, applied to Adrian for his concurrence. The pontiff readily acquiesced in her proposal for calling a council, and commissioned two legates to attend it. The first council, however, was dispersed by an insurrection of the citizens; but at the next meeting, in the city of Nice, in 787, which was protected by a military force, a decree was passed for restoring the worship of images. Adrian approved the decree, but in the western church it was deemed heretical and dangerous. Charlemagne condemned the innovation, and the French and English clergy concurred in opposing it. A treatise, containing 120 heads of refutation, was circulated as the work of Charlemagne, under the title of *The Caroline Books*, in opposition to the decree of the council. This work was presented to the pope by the king's ambassador, and the pope wrote a letter to Charlemagne by way of reply. The king, and also the Gallican and English churches, retained their sentiments; and in 794 a council was held at Frankfort on the Maine, consisting of about 300 western bishops, by which every kind of image-worship was condemned. Adrian did not live to see a termination of this contest; for after a pontificate of nearly twenty-four years, he died in 795. Adrian seems to have directed his chief attention to the embellishment of the churches and the improvement of the city of Rome; and he was probably furnished by Charlemagne, out of the plunder of his conquests, with ample means for this purpose.

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[1] This work, though called by the Roman historians *murus*, which signifies a wall of stone, was only composed of earth covered with green turf. It was carried on from the Solway Frith, a little west of the village of Burgh on the Sands, in as direct a line as possible, to the river Tyne on the east, at the place where the town of Newcastle now stands; so that it must have been above 60 English, and near 70 Roman miles in length. It consisted of four parts: 1. The principal *agger*, mound of earth or rampart, on the brink of the ditch; 2. The ditch on the north side of the rampart; 3. Another rampart on the south side of the principal one, about five paces distant from it; 4. A large rampart on the north side of the ditch. This last was probably the military way to the line of forts on this work: it was so to those formerly built by Agricola; and if it did not serve the same purpose in this, there must have been no military way attending it. The south rampart might serve for an inner defence in case the enemy should beat them from any part of the principal rampart, or it might be designed to protect the soldiers from any sudden attack of the provincial Britons. For many ages this work has been in so ruinous a condition, that it is impossible to discover its original dimensions with certainty. From their appearance, it seems probable that the principal rampart was at least ten or twelve feet high, and the south one not much less; but the north one was considerably lower. From the dimensions of the ditch, taken as it passes through a lime-stone quarry near Harlow Hill, it appears to have been nine feet deep, and eleven wide at the top, but somewhat narrower at the bottom. The north rampart was about twenty feet distant from the ditch.

[2] Spartianus, in *Adriano*.

Adrian II. *Pope*, succeeded Nicholas I. A. D. 867. Having twice refused the dignity, he accepted it in the 76th year of his age, at the united request of the clergy, nobility, and people. The contest for power between the Greek and Latin churches had been very violent some years before his accession to the papal chair. Adrian, during this contest with the eastern patriarch, was extending his authority over the kings and princes of the West. He employed his whole interest to induce Charles the Bald, who had taken possession of the kingdom of Lorraine, and who had been crowned at Rheims by the archbishop Hincmar, to relinquish it in favour of the emperor; and he even sent legates to the king, after having attempted to engage Hincmar, the clergy, and the nobility, to desert him, ordering him to surrender to the emperor's right. The king was invincible; and the pope was obliged to give up the contest. He also further interfered in the concerns of princes, by taking Charles's rebellious son Carloman, and the younger Hincmar, bishop of Laon, under the protection of the Roman see. He proceeded in this business so far, that he was under the necessity of submitting without gaining his point. Death terminated his ambitious projects and his life of inquietude A. D. 872, after a pontificate of five years.

Adrian IV. *Pope*, the only Englishman who ever had the honour of sitting in the papal chair. His name was Nicholas Brekespere, and he was born at Langley, near St Albans, in Hertfordshire. His father having left his family and taken the habit of the monastery of St Albans, Nicholas was obliged to submit to the lowest offices in that house for daily support. After some time he desired to take the habit in that monastery, but was rejected by the abbot Richard. Upon this he resolved to try his fortune in another country, and accordingly went to Paris; where, though in very poor circumstances, he applied himself to his studies with great assiduity, and made a wonderful proficiency. But having still a strong inclination to a religious life, he left Paris and removed to Provence, where he became a regular clerk in the monastery of St Rufus. He was not immediately allowed to take the habit, but passed some time by way of trial, recommending himself to the monks by a strict attention to all their commands. This behaviour, together with the beauty of his person and prudent conversation, rendered him so acceptable to the monks, that after some time they entreated him to take the habit of the canonical order. Here he distinguished himself so much by his learning and strict observance of the monastic discipline, that upon the death of the abbot he was chosen superior of that house; and we are told that he rebuilt the convent. Pope Eugenius III. being apprized of the great merit of Nicholas, and thinking he might be serviceable to the church in a higher station, created him cardinal-bishop of Alba in 1146. In 1148 his holiness sent him legate to Denmark and Norway, where, by his fervent preaching and diligent instructions, he converted those barbarous nations to the Christian faith, and erected Upsal into an archiepiscopal see. When he returned to Rome, he was received by the pope and cardinals with great marks of honour; and Pope Anastasius, who succeeded Eugenius, happening to die at this time, Nicholas was unanimously chosen to the holy see in November 1154, and he took the name of *Adrian*. When the news of his promotion reached England, King Henry II. sent Robert, abbot of St Albans, and three bishops, to Rome, to congratulate him on his election; upon which occasion Adrian granted very considerable privileges to the monastery of St Albans, particularly an exemption from all episcopal jurisdiction, excepting to the see of Rome. Adrian, in the beginning of his pontificate, boldly withstood the attempts of the Roman people to recover their ancient liberty under the consuls, and obliged those magistrates to abdicate their authority, and leave the government of the city to the pope. In 1155 he drove the heretic Arnaud of Bresse, and his followers, out of Rome. The same year he excommunicated William, king of Sicily, who ravaged the territories of the church, and absolved that prince's subjects from their allegiance. About the same time Frederick, king of the Romans, having entered Italy with a powerful army, Adrian met him near Sutrium, and concluded a peace with him. At this interview Frederick consented to hold the pope's stirrup whilst he mounted on horseback. After which his holiness conducted that prince to Rome, and in St Peter's church placed the imperial crown on his head, to the great mortification of the Roman people, who assembled in a tumultuous manner, and killed several of the imperialists. The next year a reconciliation was brought about between the pope and the Sicilian king, that prince taking an oath to do nothing further to the prejudice of the church, and Adrian granting him the title of *King of the Two Sicilies*. He built and fortified several castles, and left the papal dominions in a more flourishing condition than he found them. But notwithstanding all his success, he was extremely sensible of the disquietudes attending so high a station; and declared to his countryman John of Salisbury, that all the former hardships of his life were mere amusement to the misfortunes of the popedom, that he looked upon St Peter's chair to be the most uneasy seat in the world, and that his crown seemed to be clapped burning on his head.[1] He died September 1. 1159, in the fourth year and tenth month of his pontificate, and was buried in St Peter's church, near the tomb of his predecessor Eugenius. There are extant several letters and some homilies written by Pope Adrian.

Adrian V. *Pope*, a Genoese, whose name was Ottoboni Fiesci, succeeded Innocent V. A. D. 1276. He was by his uncle Innocent IV. created cardinal-deacon of St Adrian, and in 1254 sent by him to England, to settle the disputes between Henry III. and his barons. He was employed again for the same purpose by Clement III. when he issued a sentence of excommunication against the king's enemies. When he was congratulated on his accession to the papal chair, he said, "I wish you had found me a healthy cardinal rather than a dying pope." After his election he went to Viterbo to meet the emperor Rodolphus, for the purpose of opposing the usurpation of Charles, king of the Two Sicilies; but died soon after his arrival, having enjoyed his dignity only 38 days. He zealously encouraged the crusade to the Holy Land, and upon his election sent a large sum to Constantinople towards building galleys.

Adrian VI. *Pope*, was born at Utrecht in 1459. His father was not able to maintain him at school, but he got a place at Louvain, in a college in which a certain number of scholars were maintained *gratis*. It is reported that he used to read in the night-time by the light of the lamps in the churches or streets. He made a considerable progress in all the sciences, led an exemplary life, and there never was a man less intriguing or less forward than he. He took his degree of doctor of divinity at Louvain, was soon after made canon of St Peter's and professor of divinity at Utrecht, and then dean of St Peter's and vice-chancellor of the university. He was obliged to leave an academical life to be tutor to the archduke Charles. This young prince made no great progress under him: however, never was a tutor more considerably rewarded; for it was by Charles V.'s credit that he was raised to the papal throne. Leo X. had given him the cardinal's hat in

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[1] Baronii *Annales*, tom. xii. ann. 1154.

1517. After this pope's death, several cabals in the conclave ended in the election of Adrian, with which the people of Rome were very much displeased. He would not change his name, and in every thing he showed a great dislike for all ostentation and sensual pleasures, though such an aversion had been long ago out of date. He was very partial to Charles V. and did not enjoy much tranquillity under the triple crown. He lamented much the wicked morals of the clergy, and wished to establish a reformation of manners among them. He died September 14. 1523.

Adrian, cardinal priest, of the title of St Chrysogonus, was a native of Cornetto, in Tuscany. Innocent VIII. sent him nuncio into Scotland and into France; and after he had been clerk and treasurer of the apostolic chamber, Pope Alexander VI. whose secretary he had been, honoured him with the cardinal's hat. His life was a continued scene of odd alterations. He narrowly escaped death on the day on which Alexander VI. poisoned himself by mistake. Afterward he drew upon himself the hatred of Julius II. so that he was obliged to go and hide himself in the mountains of Trent. Having been recalled by Leo X. he was so ungrateful that he engaged in a conspiracy against him. The pope pardoned his fault; but the cardinal, not caring to trust to this, made his escape, and it could never be known exactly what was become of him. He was one of the first who effectually reformed the Latin style. He studied Cicero with great success, and made many excellent observations on the propriety of the Latin tongue. The treatise he composed, *De Sermone Latino, et de modis Latine loquendi*, is a proof of this. It was published at Rome in 1515, in folio. He also wrote, in elegant Latin, a treatise on the Christian religion, entitled *De Vera Philosophia*, printed at Cologne in 1548.

ADRIANI, Joanni Battista, was born of a patrician family of Florence in 1511. He wrote a history of his own times in Italian, which is a continuation of Guicciardini, beginning at the year 1536; to which Thuanus acknowledges himself greatly indebted: besides which, he composed six funeral orations on the emperor Charles V. and other noble personages; and is thought to have been the author of a long letter on ancient painters and sculptors, prefixed to the third volume of Vasari. He died at Florence in 1579.

ADRIANISTS, in *Ecclesiastical History*, a sect of heretics, divided into two branches. The first were disciples of Simon Magus, and flourished about the year 34. Theodoret is the only person who has preserved their name and memory, but he gives us no account of their origin. Probably this sect, and the six others which sprung from the Simonians, took their name from the particular disciples of Simon. The second were the followers of Adrian Hamstead the anabaptist, and held some particular errors concerning Christ.

ADRIANOPLE, a city of Turkey in Europe, called by the inhabitants Edrené. It is in the province of Romania or Romelia, on the river Marizza, at the spot where the Tundscha and Arda empty their waters into that stream. It is well fortified, and has a strong citadel; and, next to Constantinople, is the largest and most populous city in the Turkish dominions. The streets are irregular, unpaved, and filthy; but some of the buildings, especially the two palaces of the emperor, the seraglio, and the mosque of Sultan Selim II. are in the most magnificent style of Turkish architecture. The dwellings are 16,000, the inhabitants about 105,000, nearly one-half of whom are Greeks, with many Jews and Armenians. These several people are the chief manufacturers, and produce large quantities of silk goods, of Turkish curried red leather, of tanned leather, of woollens of various kinds, of hard ware, and of the best preparations of opium. The trade is extensive, both to Constantinople by caravans of camels. and by sea with other countries. It is supplied with fresh water by means of a noble aqueduct, carried by arches over an extensive valley, which supplies 22 public baths, 52 fountains, and 16 copious wells. It is in Long. 22. 31. E. and Lat. 41. 47. N.

ADRIANUM, or Adriaticum Mare, in *Ancient Geography*, now the Gulf of Venice, a large bay in the Mediterranean, between Dalmatia, Sclavonia, Greece, and Italy. It is called by the Greeks Αδριας Κολπος, and *Adria* by the Romans, (as *Arbiter Adriæ Notus*, Hor.) Cicero calls it *Hadrianum Mare*, Virgil has *Hadriaticas Undas*. It is commonly called *Mare Adriaticum*, without an aspiration; but whether it ought to have one, is a dispute. If the appellation is from *Hadria*, the town of the Piceni, it must be written *Hadriaticum*, because the emperor's name who thence derives his origin is on coins and stones *Hadrianus*; but if from the town in the territory of Venice, as the more ancient, and of which that of the Piceni is a colony, this will justify the common appellation *Adriaticum*. It extends from latitude 40. to 45. 55. north, between the coasts of Italy and Illyria. The tides in this sea are distinguishable, but the ebb and flow is inconsiderable, though greater than in the Mediterranean.

ADRIPALDA, a city in the province of Principato Ulteriore, in the kingdom of Naples. It is situated on the river Sabato, near to Avellino. The number of inhabitants is 4236, who carry on trade in cloth and paper, in iron and copper goods, and make large quantities of nails.

ADROGATION, in *Roman Antiquities*, a species of adoption, whereby a person who was capable of choosing for himself was admitted by another into the relation of a son. The word is compounded of *ad*, to, and *rogare*, to ask, on account of a question put in the ceremony of it, Whether the adopter would take such a person for his son? and another to the adoptive, Whether he consented to become such a person's son?

ADSIDELLA, in *Antiquity*, the table at which the flamens sat during the sacrifices.

ADSTRICTION, among physicians, a term used to denote the rigidity of any part.

ADVANCED, in a general sense, denotes something posted or situated before another. Thus,

Advanced Ditch, in *Fortification*, is that which surrounds the glacis or esplanade of a place.

Advanced Guard, or *Vanguard*, in the art of war, the first line or division of an army, ranged or marching in order of battle; or, it is that part which is next the enemy, and marches first towards them.

Advanced Guard is more particularly used for a small party of horse stationed before the main guard.

ADVENT, in the calendar, properly signifies the approach of the feast of the nativity. It includes four Sundays, and begins on St Andrew's day or on the Sunday before or after it. During advent, and to the end of the octaves of epiphany, the solemnizing of marriage is forbidden without a special licence. It is appointed to employ the thoughts of Christians on the first advent or coming of Christ in the flesh, and his second advent or coming to judge the world. The primitive Christians practised great austerity during this season.

Ad ventrem inspiciendum, in *Law*, a writ by which a woman is to be searched whether she be with child by a former husband, on her withholding lands from the next, failing issue of her own body.

Adventure Bay, the name of a bay in Van Diemen's Land, so called by Captain Cook.

ADVENTURER, in a general sense, denotes one who hazards something.

Adventurers is particularly used for an ancient company of merchants and traders, erected for the discovery of lands, territories, trades, &c. unknown. The society of adventurers had its rise in Burgundy, and its first establishment from John duke of Brabant in 1248, being known by the name of the *Brotherhood of St Thomas a Becket*. It was afterwards translated into England, and successively confirmed by Edwards III. and IV. Richard III. Henries IV. V. VI. and VII. who gave it the appellation of *Merchant Adventurers*.

ADVERB, in *Grammar*, a particle joined to a verb, adjective, or participle, to explain their manner of acting or suffering, or to mark some circumstance or quality signified by them. The word is formed from the preposition *ad*, to, and *verbum*, a verb; and signifies literally a word joined to a verb, to show how, when, or where, one is, does, or suffers; as, the boy paints *neatly*, writes *ill*; the house stands *there*, &c.

ADVERSARIA, among the ancients, a book of accounts not unlike our journals or day-books. It is also used as a title for books of miscellaneous remarks and observations.

ADVERSATIVE, in *Grammar*, a word expressing some difference between what goes before and what follows it. Thus, in the phrase, *he is an honest man, but a great enthusiast*, the word *but* is an adversative conjunction.

ADVERSATOR, in *Antiquity*, a servant who attended the rich in returning from supper, to give them notice of any obstacles in the way, on which they might be apt to stumble.

ADVERTISEMENT, in a general sense, denotes any information given to persons interested in an affair; and is more particularly used for a brief notice inserted in the public papers, for the information of all concerned.

ADULA, in *Ancient Geography*, a mountain in Rhætia, or the country of the Grisons, part of the Alps, in which are the fountains of the Rhine; now *St Gothard*.

ADULE, or Adulis, in *Ancient Geography*, a town of Egypt, built by fugitive slaves, distant from its port on the Red Sea 20 stadia. Pliny calls the inhabitants *Adulitæ*. The epithet is either *Adulitanus*, as *Monumentum Adulitanum*, on the pompous inscription of the statue of Ptolemy Euergetes, published by Leo Alatius at Rome in 1631, and to be found in Spon and Thevenot; or *Adulicus*, as *Adulicus Sinus*, a part of the Red Sea.

ADULT, an appellation given to any thing that is arrived at maturity: thus, we say an adult person, an adult plant, &c. Among civilians, it denotes a youth between 14 and 25 years of age.

ADULTERATION, the act of debasing, by an improper mixture, something that was pure and genuine. The word is Latin, formed of the verb, *adulterare*, to corrupt, by mingling something foreign to any substance.

Adulteration of Coin properly imports the making or casting of a wrong metal, or with too base or too much alloy. Adulterations of coins are effected divers ways: as, by forging another stamp or inscription; by mixing impure metals with the gold or silver; by making use of a wrong metal, or an undue alloy, or too great an admixture of the baser metals with gold or silver. Counterfeiting the stamp, or clipping and lessening the weight, does not so properly come under the denomination of *adulterating*. This term is somewhat less extensive than *debasing*, which includes diminishing, clipping, &c. To adulterate or debase the current coin is a capital crime in all nations. The ancients punished it with great severity. Among the Egyptians both hands were cut off, and by the civil law the offender was thrown to wild beasts. The emperor Tacitus enacted, that counterfeiting the coin should be capital; and under Constantine it was made treason, as it is also among us.

ADULTERINE, in the *Civil Law*, is particularly applied to a child issued from an adulterous amour or commerce. Adulterine children are more odious than the illegitimate offspring of single persons. The Roman law even refuses them the title of natural children, as if nature disowned them. Adulterine children are not easily dispensed with for admission to orders. Those are not deemed adulterine who are begotten of a woman openly married, through ignorance of a former wife being alive. By a decree of the parliament of Paris, adulterine children are declared not legitimated by the subsequent marriage of the parties, even though a papal dispensation be had for such marriage, wherein is a clause of legitimation.

Adulterine Marriages, in St Augustine's sense, denote second marriages contracted after a divorce.

ADULTERY, an unlawful commerce between one married person and another, or between a married and unmarried person.

Punishments have been annexed to adultery in most ages and nations, though of different degrees of severity. In many it has been capital; in others venial, and attended only with slight pecuniary mulcts. Some of the penalties are serious, and even cruel; others of a jocose and humorous kind. Even contrary things have been enacted as punishments for adultery. By some laws the criminals are forbidden marrying together in case they become single; by others they are forbidden to marry any besides each other: by some they are incapacitated from ever committing the like crime again; by others they are glutted with it till it becomes nauseous.

Among the rich Greeks, adulterers were allowed to redeem themselves by a pecuniary fine: the woman's father, in such cases, returned the dower he had received from her husband, which some think was refunded by the adulterer. Another punishment among those people was putting out the eyes of adulterers.

The Athenians had an extraordinary way of punishing adulterers, called *αποῤῥαφανιδωσις και παρατιλμος*, practised at least on the poorer sort who were not able to pay the fines. This was an awkward sort of empalement, performed by thrusting one of the largest radishes up the anus of the adulterer, or, in defect thereof, a fish with a large head, called *mugil*, mullet. Alcæus is said to have died in this way, though it is doubted whether the punishment was reputed mortal. Juvenal and Catullus speak of this custom as received also among the Romans, though not authorized by an express law, as it was among the Greeks.

There are various conjectures concerning the ancient punishment of adultery among the Romans. Some will have it to have been made capital by a law of Romulus, and again by the twelve tables; others, that it was first made capital by Augustus; and others, not before the emperor Constantine. The truth is, the punishment in the early days was very various, much being left to the discretion of the husband and parents of the adulterous wife, who exercised it differently, rather with the silence and countenance of the magistrate than by any formal authority from him. Thus, we are told the wife's father was allowed to kill both parties, when caught in the fact, provided he did it immediately, killed both together, and as it were with one blow. The same power ordinarily was not indulged the husband, except the crime were committed with some mean or infamous person; though, in other cases, if his rage carried him to put them to death, he was not punished as a murderer. On many occasions, however, revenge was not carried so far; but mutilating, castrating, cutting off the ears, noses, &c. served the turn. The punishment allotted by the *lex Julia* was not, as many have imagined, death, but rather banishment or deportation, being interdicted fire and water; though Octavius appears in several instances to have gone beyond his own law, and to have put adulterers to death. Under Macrinus, many were burnt at a stake. Constantine first by law made the crime capital. Under Constantius and Constans, adulterers were burnt, or sewed in sacks and thrown into the sea. Under Leo and Marcian, the penalty was abated to perpetual banishment, or cutting off the nose. Under Justinian, a further mitigation was granted, at least in favour of the wife, who was only to be scourged, lose her dower, and be shut up in a monastery. After two years, the husband was at liberty to take her back again; if he refused, she was shaven, and made a nun for life; but it still remained death in the husband. The reason alleged for this difference is, that the woman is the weaker vessel. Matthaeus declaims against the empress Theodora, who is supposed to have been the cause of this law, as well as of others procured in favour of that sex from the emperor.

Under Theodosius, women convicted of this crime were punished after a very singular manner, viz. by a public constupration; being locked up in a narrow cell, and forced to admit to their embraces all the men that would offer themselves. To this end the gallants were to dress themselves on purpose, having several little bells fastened to their clothes, the tinkling of which gave notice to those without of every motion. This custom was abolished by the same prince.

By the Jewish law, adultery was punished with death in both parties, where they were both married, or only the woman. The Jews had a particular trial or ordeal for a woman suspected of the crime, by making her drink the bitter waters of jealousy; which, if she were guilty, made her swell.

Amongst the Mingrelians, according to Chardin, adultery is punished with the forfeiture of a hog, which is usually eaten in good friendship between the gallant, the adulteress, and the cuckold. In some parts of the Indies, it is said any man's wife is permitted to prostitute herself to him who will give an elephant for the use of her; and it is reputed no small glory to her to have been rated so high. Adultery is said to be so frequent in Ceylon, that there is not a woman who does not practise it, notwithstanding its being punishable with death. Among the Japanese, and divers other nations, adultery is only penal in the woman. In the Marian islands, the woman is not punishable for adultery; but if the man go astray he pays severely; the wife and her relations waste his lands, turn him out of his house, &c.

In Spain they punished adultery in men by cutting off the instrument of the crime. In Poland, before Christianity was established, they punished adultery and fornication in a particular manner: the criminal they carried to the market-place, and there fastened him by the offending part with a nail, laying a razor within his reach, and leaving him under a necessity either of doing justice upon himself, or of perishing in that condition.

In England adultery by the ancient laws was severely punished. King Edmund the Saxon ordered it to be punished in the same manner as homicide; and Canute the Dane ordered that a man who committed adultery should be banished, and that the woman should have her nose and ears cut off. In the time of Henry I. it was punished with the loss of eyes and genitals.

In Britain adultery is now reckoned a spiritual offence, that is, cognizable by the spiritual courts, where it is punished by fine and penance. The common law takes no further notice of it than to allow the party aggrieved an action and damages. This practice is often censured by foreigners, as making too light of a crime, the bad consequences of which, public as well as private, are so great. It has been answered, that perhaps this penalty, by civil action, joined with the ignominy attached to it, is more calculated to prevent the frequency of the offence, which ought to be the end of all laws, than a severer punishment.

Adultery is, both in England and Scotland, a ground of divorce; but in the former a *complete* divorce can only be obtained through an act of parliament, whereas in the latter a complete divorce may be effected by the sentence of the consistorial or commissary court. The adulterous parties are by the law of Scotland prohibited from intermarrying with each other. See DIVORCE.

ADULTERY is used in Scripture for idolatry, or departing from the true God to the worship of a false one.

ADULTERY is used by ecclesiastical writers for a person's invading or intruding into a bishopric during the former bishop's life. The reason of the appellation is, that a bishop is supposed to contract a kind of spiritual marriage with his church. The translation of a bishop from one see to another was also reputed a species of adultery, on the supposition of its being a kind of second marriage, which in those days was esteemed a degree of adultery. This conclusion was founded on the text of St Paul, *Let a bishop be the husband of one wife;* by a forced construction of church for wife, and of bishop for husband.

ADULTERY is used by ancient naturalists for the act of ingrafting one plant upon another; in which sense Pliny speaks of the adulteries of trees, *arborum adulteria*, which he represents as contrary to nature, and a piece of luxury or needless refinement.

ADVOCATE, among the Romans, a person skilled in their law, who undertook the defence of causes at the bar. The Roman advocates answered to one part of the office of a barrister in England, viz. the pleading part; for they never gave counsel, that being the business of the *jurisconsulti*.

The Romans, in the first ages of their state, held the profession of an advocate in great honour; and the seats of their bar were crowded with senators and consuls, they whose voices commanded the people thinking it an honour to be employed in defending them. They were styled *comites*, *honorati*, *clarissimi*, and even *patroni;* as if their clients were not less obliged to them than freedmen to their masters. The bar was not at that time venal. Those who aspired to honours and offices took this way of gaining an interest in the people, and always pleaded *gratis*. But no sooner were luxury and corruption introduced into the commonwealth, than the bar became a sharer in them. Then it was that the senators let out their voices for pay, and zeal and eloquence were sold to the highest bidder. To put a stop to this abuse, the tribune Cincius procured a law to be passed, called from him *Lex Cincia*, whereby the advocates were forbidden to take any money of their clients. It had before this been prohibited the advocates to take any presents or gratuities for their pleading. The emperor Augustus added a penalty to it; notwithstanding which, the advocates played their part so well, that the emperor Claudius thought it an extraordinary circumstance, when he obliged them not to take above eight great sesterces, which are equivalent to about L.64 sterling, for pleading each cause.

ADVOCATE is still used in countries and courts where the civil law obtains, for those who plead and defend the causes of clients intrusted to them.

Advocate of a City, in the German polity, a magistrate appointed in the emperor's name to administer justice.

Advocate is more particularly used in church history for a person appointed to defend the rights and revenues of a church or religious house. The word *advocatus*, or *advowee*, is still retained for what we usually call the *patron*, or he who has the advowson or right of presentation in his own name.

Consistorial Advocates, officers of the consistory at Rome, who plead in all oppositions to the disposal of benefices in that court. They are ten in number.

Elective Advocates, those chosen by the abbot, bishop, or chapter, a particular license being had from the king or prince for that purpose. The elections were originally made in the presence of the count of the province.

Feudal Advocates. These were of the military kind, who, to make them more zealous for the interest of the church, had lands granted them in fee, which they held of the church, and did homage and took an oath of fidelity to the bishop or abbot. These were to lead the vassals of the church to war, not only in private quarrels of the church itself, but in military expeditions for the king's service, in which they were the standard-bearers of their churches.

Fiscal Advocate, fisci advocatus, in *Roman Antiquity*, an officer of state under the Roman emperors, who pleaded in all causes wherein the *fiscus* or private treasury was concerned.

Juridical Advocates, in the middle age, were those who, from attending causes in the court of the *comes* or count of the province, became judges themselves, and held courts of their vassals thrice a year, under the name of the *tria placita generalia*. In consideration of this further service, they had a particular allowance of one third part of all fines or mulcts imposed on defaulters, &c. besides a proportion of diet for themselves and servants.

Matricular Advocates were the advocates of the mother or cathedral churches.

Military Advocates, those appointed for the defence of the church, rather by arms and authority than by pleading and eloquence. These were introduced in the times of confusion, when every person was obliged to maintain his own property by force. Bishops and abbots not being permitted to bear arms, and the scholastic or gowned advocates being equally unacquainted with them, recourse was had to knights, noblemen, soldiers, or even to princes.

Nominative Advocates, those appointed by a king or pope. Sometimes the churches petitioned kings, &c. to appoint them an advocate; at other times this was done of their own accord. By some regulations no person was capable of being elected advocate unless he had an estate in land in the same country.

Regular Advocates, those duly formed and qualified for their profession, by a proper course of study, the requisite oath, subscription, license, &c.

Subordinate Advocates, those appointed by other superior ones, acting under them, and accountable to them. There are various reasons for the creation of these subordinate advocates; as, the superior quality of the principal advocate, his being detained in war, or being involved in other affairs; but chiefly the too great distance of some of the church-lands, and their lying in the dominions of foreign princes.

Supreme Sovereign Advocates were those who had the authority in chief, but acted by deputies or subordinate advocates. These were called also *principal*, *greater*, and sometimes *general* advocates. Such, in many cases, were kings, &c. when they had either been chosen advocates, or became such by being founders or endowers of churches. Princes had also another title to advocateship, some of them pretending to be *advocati nati* of the churches within their dominions.

Advocates, in the English courts, are more generally called *counsel*.

Faculty of Advocates, in Scotland, a respectable body of lawyers, who plead in all causes before the courts of session, justiciary, and exchequer. They are also entitled to plead in the house of peers in appeal cases from Scotland.

A candidate for the office of an advocate undergoes three several trials; the first is upon the civil law; the second upon the municipal law of Scotland; and, in the third, he is obliged to defend a Latin thesis, which is impugned by three or more members of the faculty. The first examination, which is now in English, is confined to the Institutes, and has no reference to any particular text-book; but the candidate is required to read and translate a passage of the Pandects.

The faculty at present (1829) consists of 324 members. As the profession of an advocate is esteemed the genteelest in Scotland, many gentlemen of fortune become members of the faculty without having any intention of practising at the bar. This circumstance greatly increases their number, gives dignity to the profession, and enriches their library and public fund. It is from this respectable body that all vacancies on the bench are generally supplied.

Lord Advocate, or *King's Advocate*, one of the eight great officers of state in Scotland, who as such sat in parliament without election. He is the principal crown lawyer in Scotland. His business is to act as a public prosecutor, and to plead in all causes that concern the crown, but particularly in such as are of a criminal nature. The office of king's advocate is not very ancient: it seems to have been established about the beginning of the sixteenth century. Originally he had no power to prosecute crimes without the concurrence of a private party; but, in the year 1597, he was empowered to prosecute crimes at his own instance. He has the privilege of pleading in court with his hat on. This privilege was first granted to Sir Thomas Hope, who having three sons lords of session, it was thought indecent that the father should plead uncovered before the sons, who as judges sat covered.

ADVOCATION, in *Scotish Law*, a mode of appeal from certain inferior courts to the supreme court. The writ employed is called a *Bill of Advocation*.

ADVOWEE, in ancient customs and law books, denotes the advocate of a church, religious house, or the like. There were advowees of cathedrals, abbeys, monasteries, &c. Thus, Charlemagne had the title of advowee of St Peter's; King Hugh, of St Riquier; and Bolandus mentions some letters of Pope Nicholas, by which he constituted King Edward the Confessor and his successors advowees of the monastery at Westminster, and of all the churches in England. These advowees were the guardians, protectors, and administrators of the temporal concerns of the churches, &c.; and under their authority were passed all contracts which related to them. It appears also, from the most ancient charters, that the donations made to churches were conferred on the persons of the advowees. They always pleaded the causes of the churches in court, and distributed justice for them, in the places under their jurisdiction. They also commanded the forces furnished by their monasteries, &c. for the war, and even were their champions, and sometimes maintained duels for them.

This office is said to have been first introduced in the fourth century, in the time of Stillico; though the Benedictines do not fix its origin before the eighth century. By degrees men of the first rank were brought into it, as it was found necessary either to defend with arms or to protect with power and authority. In some monasteries they were only called *conservators;* but these, without the name, had all the functions of advowees. There were also sometimes several sub-advowees or sub-advocates in each monastery, who officiated instead of the advowees themselves; which, however, proved the ruin of monasteries, those inferior officers running into great abuses.

Hence also, husbands, tutors, and every person in general who took upon him the defence of another, were denominated *advowees* or advocates. Hence several cities had their advowees, which were established long after the ecclesiastical ones, and doubtless from their example. Thus, we read in history of the advowees of Augsburg, of Arras, &c.

The *vidames* assumed the quality of advowees; and hence it is that several historians of the eighth century confound the two functions together. Hence also it is that several secular lords in Germany bear mitres for their crests, as having anciently been advowees of the great churches.

Spelman distinguishes two kinds of ecclesiastical advowees: the one, of causes or processes, *advocati causarum;* the other, of territory or lands, *advocati soli.* The former were nominated by the king, and were usually lawyers, who undertook to plead the causes of the monasteries. The other, which still subsist, and are sometimes called by their primitive name, *advowees,* though more usually *patrons,* were hereditary, as being the founders and endowers of churches, &c. or their heirs.

Women were sometimes advowees, *advocatissæ;* and the canon law mentions some who had this title, and who had the same right of presentation, &c. in their churches which the advowees themselves had. In statute 25 Edw. III. we meet with *advowee paramount* for the highest patron; that is, the king.

ADVOWSON, or ADVOWZEN, in *Common Law,* signifies a right to present to a vacant benefice. Advowson is so called because the right of presenting to the church was first gained by such as were founders, benefactors, or maintainers of the church. Though the nomination of fit persons to officiate in every diocese was originally in the bishop, yet they were content to let the founders of churches have the nomination of the persons to the churches so founded, reserving to themselves a right to judge of the fitness of the persons nominated.—Advowsons formerly were most of them appendant to manors, and the patrons were parochial barons. The lordship of the manor and patronage of the church were seldom in different hands, until advowsons were given to religious houses. But of late times the lordship of the manor and advowson of the church have been divided.—Advowsons are *presentative, collative,* or *donative: presentative,* where the patron presents or offers his clerk to the bishop of the diocese, to be instituted in his church; *collative,* where the benefice is given by the bishop, as original patron thereof, or by means of a right he has acquired by lapse; *donative,* where the king or other patron does, by a single donation in writing, put the clerk into possession, without presentation, institution, or induction.

Sometimes, anciently, the patron had the sole nomination of the prelate, abbot, or prior, either by investiture (*i. e.* delivery of a pastoral staff) or by direct presentation to the diocesan; and if a free election was left to the brotherhood, yet a *congé d'élire,* or licence of election, was first to be obtained of the patron, and the person elected was confirmed by him. If the founder's family became extinct, the patronage of the convent went to the lord of the manor.—Advowsons are temporal inheritances and lay fees: they may be granted by deed or will, and are assets in the hands of heirs or executors. Presentations to advowsons for money or other reward are void. (31 Eliz. cap. 6.) In Scotland this right is called *patronage.*

ADY, in *Natural History,* a name given to the palm-tree of the island of St Thomas. It is a tall tree, with a thick, bare, upright stem, growing single on its root, of a thin light timber, and full of juice. The head of this tree shoots into a vast number of branches, which being cut off, or an incision being made therein, afford a great quantity of sweet juice, which, fermenting, supplies the place of wine among the Indians. The fruit of this tree is called by the Portuguese *caryoces* and *cariosse,* and by the black natives *abanga.* This fruit is of the size and shape of a lemon, and contains a kernel, which is good to eat. The fruit itself is eaten roasted, and the raw kernels are often mixed with mandioc meal. These kernels are supposed very cordial. An oil is also prepared from this fruit, which answers the purpose of oil or butter. This oil is also used for anointing stiff and contracted parts of the body.

ADYNAMIA, in *Medicine,* of *a* privative, and δυναμις, *strength,* want of power, debility or weakness from sickness.

ADYNAMON, among ancient physicians, a kind of weak factitious wine, prepared from must boiled down with water, to be given to patients to whom genuine wine might be hurtful.

ADYTUM, in *Pagan Antiquity,* the most retired and sacred place of temples, into which none but the priests were allowed to enter. The *Sanctum Sanctorum* of the temple of Solomon was of the nature of the pagan adytum, none but the high-priest being admitted into it, and he but once a year.

ADZE, or ADDICE, a cutting tool of the axe kind, having its blade made thin and arching, and its edge at right angles to the handle; chiefly used for taking off thin chips of timber or boards, and for paring away certain irregularities which the axe cannot come at. The adze is used by carpenters, but more by coopers, as being convenient for cutting the hollow sides of boards, &c. It is ground from a base on its inside to its outer edge; so that, when it is blunt, they cannot conveniently grind it without taking its helve out of the eye.

AE, or Æ, a diphthong compounded of A and E. Authors are by no means agreed as to the use of the *æ* in English words. Some, out of regard to etymology, insist on its being retained in all words, particularly technical ones, borrowed from the Greek and Latin; while others, from a consideration that it is no proper diphthong in our language (its sound being no other than that of the simple *e*), contend that it ought to be entirely disused; and in fact the simple *e* has of late been adopted instead of the Roman *æ,* as in the word *equator,* &c.

ÆACEA, in *Grecian Antiquity,* solemn festivals and games celebrated at Ægina in honour of Æacus.

ÆACUS, the son of Jupiter by Ægina. When the isle of Ægina was depopulated by a plague, his father, in compassion to his grief, changed all the ants upon it into men and women, who were called *Myrmidones,* from μυρμηξ, *an ant.* The foundation of the fable is said to be, that when the country had been depopulated by pirates, who forced the few that remained to take shelter in caves, Æacus encouraged them to come out, and by commerce and industry recover what they had lost. His character for justice was such, that, in a time of universal drought, he was nominated by the Delphic oracle to intercede for Greece, and his prayer was answered. See the article ÆGINA. The Pagans also imagined that Æacus, on account of his impartial justice, was chosen by Pluto one of the three judges of the dead; and that it was his province to judge the Europeans.

ÆBUDÆ, a name anciently given to the Western Islands of Scotland.

ÆCHMALOTARCHA, in *Jewish Antiquity*, a title given to the principal leader or governor of the Hebrew captives residing in Chaldea, Assyria, and the neighbouring countries. This magistrate was called by the Jews *rasch-galuth*, *i. e.* the chief of the captivity; but the above term, of like import in the Greek, is that used by Origen and others who wrote in the Greek tongue.

ÆDES, in *Roman Antiquity*, besides its more ordinary signification of a house, likewise signified an inferior kind of temple, consecrated to some deity.

ÆDICULA, a term used to denote the inner part of the temple, where the altar and statue of the deity stood.

ÆDILE (*ædilis*), in *Roman Antiquity*, a magistrate whose chief business was to superintend buildings of all kinds, but more especially public ones, as temples, aqueducts, bridges, &c. To the ædiles likewise belonged the care of the highways, public places, weights and measures, &c. They also fixed the prices of provisions, took cognizance of debauches, punished lewd women and such persons as frequented gaming-houses. The custody of the *plebiscita*, or orders of the people, was likewise committed to them. They had the inspection of comedies and other pieces of wit; and were obliged to exhibit magnificent games to the people, at their own expense, whereby many of them were ruined. They had the power, on certain occasions, of issuing edicts, and by degrees they procured to themselves a considerable jurisdiction. All these functions, which rendered the ædiles so considerable, belonged at first to the ædiles of the people, *ædiles plebeii*, or *minores*. These were only two in number, and were first created in the same year as the tribunes; for the tribunes, finding themselves oppressed with the multiplicity of affairs, demanded of the senate to have officers to whom they might intrust matters of less importance; and accordingly two ædiles were created; and hence it was that the ædiles were elected every year at the same assembly as the tribunes. But these plebeian ædiles having refused, on a signal occasion, to treat the people with shows, pleading that they were unable to support the expense thereof, the patricians made an offer to do it, provided they would admit them to the honours of the *ædilate*. On this occasion there were two new ædiles created, of the number of the patricians, in the year of Rome 388. They were called *ædiles curules*, or *majores*, as having a right to sit on a curule chair, enriched with ivory, when they gave audience; whereas the plebeian ædiles only sat on benches. Besides that the curule ædiles shared all the ordinary functions with the plebeian, their chief employment was, to procure the celebration of the grand Roman games, and to exhibit comedies, shows of gladiators, &c. to the people; and they were also appointed judges in all cases relating to the selling or exchanging of estates. To ease these first four ædiles, Cæsar created a new kind, called *ædiles cereales*, as being deputed chiefly to take care of the corn, which was called *donum Cereris*; for the heathens honoured Ceres as the goddess who presided over corn, and attributed to her the invention of agriculture. These ædiles cereales were also taken out of the order of patricians. In the municipal cities there were ædiles, and with the same authority as at Rome.

We also read of an *ædilis alimentarius*, expressed in abbreviature by *Ædil. alim.* whose business seems to have been to provide diet for those who were maintained at the public charge, though others assign him a different office.—In an ancient inscription we also meet with *ædile* of the camp, *ædilis castrorum*.

ÆDILITIUM EDICTUM, among the Romans, was that whereby a remedy was given to a buyer in case a vicious or unsound beast or slave was sold to him. It was called *ædilitium*, because the preventing of frauds in sales and contracts belonged especially to the curule ædiles.

ÆDITUUS, in *Roman Antiquity*, an officer belonging to the temple, who had the charge of the offerings, treasure, and sacred utensils. The female deities had a female officer of this kind called *Æditua*.

ÆGADES, islands off the western coast of Sicily, between Trapani and Marsala, consisting of Maritimo, Levanso, and Favignana, which were of some note during the first Punic war.

ÆGAGROPILA, a ball composed of hair, generated in the stomach of the chamois goat, which is similar to those found in cows, hogs, &c. There is another species of ball found in some animals, particularly horses, which is a calculous concretion.

ÆGEAN SEA, in *Ancient Geography*, now the *Archipelago*, a part of the Mediterranean, separating Europe from Asia Minor; washing, on the one hand, Greece and Macedonia; on the other, Caria and Ionia. The origin of the name is greatly disputed. Festus advances three opinions: one, that it is so called from the many islands therein appearing at a distance like so many goats; another, because Ægea, queen of the Amazons, perished in it; a third, because Ægeus, the father of Theseus, threw himself headlong into it.

ÆGEUS, in fabulous history, was king of Athens, and the father of Theseus. The Athenians having basely killed the son of Minos, king of Crete, for carrying away the prize from them, Minos made war upon them; and being victorious, imposed this severe condition on Ægeus, that he should annually send into Crete seven of the noblest of the Athenian youths, chosen by lot, to be devoured by the Minotaur. On the fourth year of this tribute, the choice fell on Theseus; or, as others say, he himself entreated to be sent. The king, at his son's departure, gave orders, that as the ship sailed with black sails, it should return with the same in case he perished; but, if he became victorious, he should change them into white. When Theseus returned to Crete, after killing the Minotaur, and forgot to change the sails in token of his victory, according to the agreement with his father, the latter, who watched the return of the vessel, supposing by the black sails that his son was dead, cast himself headlong into the sea, which afterwards obtained the name of the *Ægean Sea*. The Athenians decreed Ægeus divine honours, and sacrificed to him as a marine deity the adopted son of Neptune.

ÆGIAS, among physicians, a white speck on the pupil of the eye, which occasions a dimness of sight.

ÆGIDA, now *Capo d'Istria*, the principal town on the north of the territory of Istria, situated in a little island, joined to the land by a bridge. In an inscription it is called *Ægidis Insula*. Long. 14. 20. E. Lat. 45. 50. N. It was afterwards called *Justinopolis*, after the emperor Justinus.

ÆGILOPS, the name of a tumour in the great angle of the eye, either with or without an inflammation. The word is compounded of *αιξ*, *goat*, and *ωψ*, *eye*; as goats are supposed extremely liable to this distemper. If the ægilops be accompanied with an inflammation, it is supposed to take its rise from the abundance of blood which a plethoric habit discharges on the corner of the eye. If it be without an inflammation, it is supposed to proceed from a viscous pituitous humour, thrown upon this part. The method of cure is the same as that of the ophthalmia. But before it has reached the lachrymal passages, it is managed like other ulcers. If the ægilops be neglected, it bursts, and degenerates into a fistula, which eats into the bone.

ÆGIMURUS, in *Ancient Geography*, an island in the bay of Carthage, about 30 miles distant from that city, (Livy); now the *Goletta.* This island being afterwards sunk in the sea, two of its rocks remained above water, which were called *Aræ*, because the Romans and Carthaginians entered into an agreement or league to limit their respective boundaries by these rocks.

ÆGINA, in fabulous history, the daughter of Asopus, king of Bœotia, was beloved by Jupiter, who debauched her in the similitude of a lambent flame, and then carried her from Epidaurus to a desert island called *Œnopia*, which afterwards obtained her own name.

ÆGINA, in *Ancient Geography*, an island in the Saronic gulf, 20 miles distant from the Piræus, formerly vying with Athens in naval power, and at the sea-fight of Salamis disputing the palm of victory with the Athenians. It was the country and kingdom of Æacus, who called it *Ægina*, from his mother's name, it being before called *Œnopia.* (Ovid.) The inhabitants were called *Æginetæ*, and *Æginenses.* The Greeks had a common temple dedicated to Jupiter in Ægina, the remains of which still exist. The Æginetæ applied themselves to commerce, and were the first who coined money called Νομισμα Αργυρων; hence *Ægineticum æs*, formerly in great repute. The inhabitants were called *Myrmidones*, or a nation of ants, from their great application to agriculture. The island was reckoned 180 stadia, or 22 miles and a half, in circumference. It is now called *Ægina*, the *g* soft and the *i* short, and was generally the seat of the Greek government in 1828 and 1829. The temple above mentioned is situated upon the summit of a mountain called *Panhellenius*, at some distance from the shore. It was of the Doric order, and had six columns in front. Twenty-one of the exterior columns are yet standing, with two in the front of the pronaos and of the posticum, and five of the number which formed the ranges of the cell. The entablature, except the architrave, is fallen. The stone is of a light brownish colour, much eaten in many places, and indicating a very great age. Some of the columns have been injured by boring to their centres for the metal. In several, the junction of the parts is so exact that each seems to consist of one piece. This ruin Mr Chandler considers as scarcely to be paralleled in its claim to a remote antiquity. The situation, on a lonely mountain at a distance from the sea, has preserved it from total demolition amid all the changes and accidents of numerous centuries. The soil of this island is, as described by Strabo, very stony, especially the bottoms; but in some places not unfertile in grain. Besides corn, it produces olives, grapes, and almonds; and abounds in pigeons and partridges. It has been related, that the Æginetans annually wage war with the feathered race, carefully collecting or breaking their eggs, to prevent their multiplying to such numbers as to produce a famine. They have no hares, foxes, or wolves. The rivers in summer are all dry.

ÆGINA, the capital of the above island. Its site has been long forsaken. Instead of the temples mentioned by Pausanias, there are 13 lonely churches, all very mean; and two Doric columns supporting their architrave. These stand by the sea-side, towards the low cape; and, it has been supposed, are a remnant of a temple of Venus, which was situated by the port principally frequented. The walls belonging to the ports and arsenal were of excellent masonry, and may be traced to a considerable extent, above, or nearly even with the water. At the entrance of the mole, on the left, is a small chapel of St Nicholas; and opposite, a square tower with steps before it, detached from which a bridge was laid across, to be removed on any alarm. This structure, which is mean, was erected by the Venetians while at war with the Turks in 1693.

ÆGINETA, PAULUS, a celebrated surgeon of the island of Ægina, from whence he derived his name. According to M. le Clerc's calculation, he lived in the fourth century; but Abulfaragius the Arabian, who is allowed to give the best account of those times, places him with more probability in the seventh. His knowledge in surgery was very great, and his works are deservedly famous. Fabricius ab Aquapendente has thought fit to transcribe him in a great variety of places. Indeed, the doctrine of Paulus Ægineta, together with that of Celsus and Albucasis, make up the whole text of this author. He is the first writer who takes notice of the cathartic quality of rhubarb; and, according to Dr Milward, is the first in all antiquity who deserves the title of man-midwife.

ÆGINHARD, the celebrated secretary and supposed son-in-law of Charlemagne. He is said to have been carried through the snow on the shoulders of Imma, to prevent his being traced from her apartments by the emperor her father; a story which the elegant pen of Addison has copied and embellished in the third volume of the Spectator. There is a letter of Æginhard's still extant, lamenting the death of his wife, written in the tenderest strain of connubial affliction: but it does not say that this lady was the affectionate princess; and indeed some late critics have proved that Imma was not the daughter of Charlemagne. He was a native of Germany, and educated by the munificence of his imperial master, of which he has left the most grateful testimony in his preface to the life of that monarch. Æginhard, after the loss of his wife, is supposed to have passed the remainder of his days in religious retirement, and to have died soon after the year 840. His life of Charlemagne, his annals from 741 to 889, and his letters, are all inserted in the 2d volume of Duchesne's *Scriptores Francorum.* An improved edition of this valuable historian, with the annotations of Hermann Schmincke, in 4to, was published in 1711.

ÆGIPAN, in *Heathen Mythology*, a denomination given to the god Pan, because he was represented with the horns, legs, feet, &c. of a goat.

ÆGIPHILA, in *Botany*, GOAT-FRIEND.

ÆGIS, in *Ancient Mythology*, a name given to the shield or buckler of Jupiter and Pallas. The goat Amalthæa, which had suckled Jove, being dead, that god is said to have covered his buckler with the skin; whence the appellation *ægis*, from *αιξ, αιγος, she-goat.* Jupiter afterwards restored the animal to life, covered it with a new skin, and placed it among the stars. He made a present of his buckler to Minerva; whence that goddess's buckler is also called *ægis.* Minerva having killed the Gorgon Medusa, nailed her head in the middle of the ægis, which henceforth had the faculty of converting into stone all those who looked upon it; as Medusa herself had during her life. Others suppose the ægis not to have been a buckler, but a cuirass or breastplate; and it is certain that the ægis of Pallas, described by Virgil, *Æn.* lib. viii. ver. 435, must have been a cuirass, since that poet says expressly that Medusa's head was on the breast of the goddess. But the ægis of Jupiter, mentioned a little higher, ver. 354, seems to have been a buckler. The words—

> ...... Cum sæpe nigrantem
> *Ægide* concuteret dextra,

are descriptive of a buckler, but not at all of a cuirass or breastplate. Servius makes the same distinction on the two passages of Virgil; for on verse 354 he takes the ægis for the buckler of Jupiter, made, as above mentioned, of the skin of the goat Amalthæa; and on verse 435 he describes the ægis as the armour which covers the breast, and which in speaking of men is called *cuirass*, and *ægis* in speaking of the gods. Many authors have overlooked these distinctions for want of going to the sources.

ÆGISTHUS, in *Ancient History*, was the son of Thyestes by his own daughter Pelopea, who, to conceal her shame, exposed him in the woods. Some say he was taken up by a shepherd, and suckled by a goat; whence he was called *Ægisthus*. He seduced Clytemnestra, the wife of Agamemnon, and lived with her during the siege of Troy. Afterwards with her assistance he slew her husband, and reigned seven years in Mycenæ. He was, together with Clytemnestra, slain by Orestes. Pompey used to call Julius Cæsar *Ægisthus*, on account of his having seduced his wife Mutia, whom he afterwards put away, though he had three children by her.

ÆGIUM, in *Ancient Geography*, a town of Achaia Propria, five miles from the place where Helice stood, and famous for the council of the Achæans, which usually met there, on account probably of the commodious situation of the place.

ÆGOBOLIUM, in *Antiquity*, the sacrifice of a goat offered to Cybele. The ægobolium was an expiatory sacrifice, which bore a near resemblance to the taurobolium and criobolium, and seems to have been sometimes joined with them.

ÆGOPODIUM, in *Botany*, SMALL WILD ANGELICA, GOATWORT, GOATSFOOT.

ÆGOSPOTAMOS, in *Ancient Geography*, a river in the Thracian Chersonesus, falling with a south-east course into the Hellespont, to the north of Sestos; with a town, and a station or road for ships, at its mouth. Here the Athenians under Conon, through the fault of his colleague Isocrates, received a signal overthrow from the Lacedemonians under Lysander, which was followed by the taking of Athens, and put an end to the Peloponnesian war.

ÆGYPTIACUM, in *Pharmacy*, the name of several detergent ointments; as black, red, white, simple, and compound.

ÆGYPTILLA, in *Natural History*, the name of a stone described by the ancients, and said by some authors to have the remarkable quality of giving water the colour and taste of wine. This seems a very imaginary virtue, as are indeed too many of those in former ages attributed to stones. The descriptions left us of this remarkable fossil tell us, that it was variegated with, or composed of, veins of black or white, or black and bluish, with sometimes a plate or vein of whitish red. The authors of these accounts seem to have understood by this name the several stones of the onyx, sardonyx, and cameo kind; all which we have at present common among us, but none of which possesses any such strange properties.

ÆGYPTUS, in fabulous history, was the son of Belus, and brother of Danaus.

AEINAUTÆ, in *Antiquity*, *αειναυται*, *always mariners*, a denomination given to the senators of Miletus, because they held their deliberations on board a ship, and never returned to land till matters had been agreed on.

ÆLFRIC, an eminent ecclesiastic of the 10th century, was the son of an earl of Kent, and a monk of the Benedictine order in the monastery of Abingdon. In 963 he was settled in the cathedral of Winchester, under Athelwold the bishop, and undertook the instruction of the youth of the diocese; for which purpose he compiled a Latin-Saxon vocabulary, and some Latin colloquies. He also translated from the Latin into Saxon many of the historical books of the Old Testament. While he resided at Winchester he drew up Canons, which are a kind of charge to be delivered by the bishops to their clergy. He was afterwards abbot of St Albans, bishop of Wilton, and finally, in 994, translated to the see of Canterbury. Here he had a hard struggle for some years in bravely defending his diocese against the incursions of the Danes. He died in 1005, and was buried at Abingdon; but his remains were removed to Canterbury in the reign of Canute. Ælfric is held up as one of the most distinguished prelates of the Saxon church. His learning, for the times, was considerable, his morals pure, and his religious sentiments untainted with many of the corruptions of his age. Besides the works already mentioned, he translated two volumes of Homilies from the Latin Fathers.

ÆLIA, CAPITOLINA, a name given to the city built by the emperor Adrian, A. D. 134, near the spot where the ancient Jerusalem stood, which he found in ruins when he visited the eastern parts of the Roman empire. A Roman colony was settled here, and a temple, in place of that of Jerusalem, was dedicated to Jupiter Capitolinus. Hence the name is derived, to which he prefixed that of his own family.

ÆLIAN, CLAUDIUS, born at Præneste, in Italy. He taught rhetoric at Rome, according to Perizonius, under the emperor Alexander Severus. He was surnamed Μελιγλωσσος, *Honey-mouth*, on account of the sweetness of his style in his discourses and writings. He was likewise honoured with the title of *Sophist*, an appellation in his days given only to men of learning and wisdom. He loved retirement, and devoted himself to study. He greatly admired and studied Plato, Aristotle, Isocrates, Plutarch, Homer, Anacreon, Archilochus, &c. and, though a Roman, gives the preference to the writers of the Greek nation. His curious and entertaining work entitled *Variæ Historiæ* has been frequently republished. The edition published at Amsterdam in 1731, by Gronovius, *cum notis variorum*, consists of two 4to volumes. His treatise *De Natura Animalium* has also been several times reprinted. A very useful edition, in all respects indeed the best, was published by Schneider, at Leipsic, in 1784, in 8vo. Besides the above, the collated edition of his works, published by Gesner, contains his *Epistolæ Rusticæ*.

AELTERE, a town with 3973 inhabitants, in the arrondissement of Ghent, and province of East Flanders.

ÆLURUS, in *Egyptian Mythology*, the deity or god of cats; represented sometimes like a cat, and sometimes like a man with a cat's head. The Egyptians had so superstitious a regard for this animal, that the killing of it, whether by accident or design, was punished with death; and Diodorus relates, that, in the time of extreme famine, they chose rather to eat one another than touch these sacred animals.

AEM, AM, or AME, a liquid measure used in most parts of Germany, but different in different towns. The aem commonly contains 20 vertils, or 80 masses: that of Heidelberg is equal to 48 masses, and that of Wirtemberg to 160 masses.

ÆMILIUS, PAULUS, the son of Paulus Æmilius who was killed at the battle of Cannæ. He was twice consul. In his first consulate he triumphed over the Ligurians, and in the second subdued Perseus, king of Macedonia, and reduced that country to a Roman province, on which he obtained the surname of Macedonicus. He returned to Rome loaded with glory, and triumphed for three days. He died 168 years before Christ.

ÆMILIUS, *Paulus*, a celebrated historian, born at Verona, who obtained such reputation in Italy, that he was invited into France by the cardinal of Bourbon, in the reign of Louis XII., in order to write the history of the kings of France in Latin, and was presented to a canonry in the cathedral of Paris. He died at Paris on the 5th of May 1529. His work entitled *De Rebus gestis Francorum* was translated into French by Renard in 1581, and it has also been translated into Italian and German.

ÆMOBOLIUM, in *Antiquity*, the blood of a bull or ram offered in the sacrifices, called *taurobolia* and *criobolia*; in which sense the word occurs in ancient inscriptions.

ÆNEAS, in fabulous history, a famous Trojan prince, the son of Anchises and Venus. At the destruction of Troy, he bore his aged father on his back, and saved him from the Greeks; but, being too solicitous about his son and household gods, lost his wife Creüsa in the escape. Landing in Africa, he was kindly received by Queen Dido; but quitting her coast, he arrived in Italy, where he married Lavinia, the daughter of King Latinus, and defeated Turnus, to whom she had been contracted. After the death of his father-in-law, he was made king of the Latins, over whom he reigned three years; but joining with the Aborigines, he was slain in a battle against the Tuscans. Virgil has rendered the name of this prince immortal, by making him the hero of his poem.

ÆNEAS SYLVIUS, *Pope*. See PIUS II.

ÆNEATORES, in *Antiquity*, the musicians in an army, including those that played on trumpets, horns, &c. The word is formed from *æneus*, on account of the brazen instruments used by them.

ÆNEID, the name of Virgil's celebrated epic poem, devoted to celebrate the establishment of Æneas in Italy.

ÆNGIA, one of the islands of the Archipelago. It lies in the bay of Engia, and the town of that name contains about 800 houses and a castle; and near it are the ruins of a magnificent structure, which was formerly a temple.

ÆNIGMA denotes any dark saying, wherein some well-known thing is concealed under obscure language. The word is Greek, *Αινιγμα*, formed of *αινιττεσθαι*, *obscure innuere*, to hint a thing darkly, and of *αινος*, an obscure speech or discourse. The popular name is *riddle;* from the Belgic *raeden*, or the Saxon *araethan*, to interpret.

Painted ÆNIGMAS are representations of the works of nature or art, concealed under human figures, drawn from history or fable.

A Verbal ÆNIGMA is a witty, artful, and abstruse description of any thing. In a general sense, every dark saying, every difficult question, every parable, may pass for an ænigma. Hence obscure laws are called *ænigmata juris*. The alchemists are great dealers in the ænigmatic language, their processes for the philosopher's stone being generally wrapt up in riddles: *e. g. Fac ex mare et fœmina circulum, inde quadrangulum, hinc triangulum, fac circulum, et habebis lapidem philosophorum.*

F. Menestrier has attempted to reduce the composition and resolution of ænigmas to a kind of art, with fixed rules and principles, which he calls *the philosophy of ænigmatic images.*

The Subject of an ÆNIGMA, or the thing to be concealed and made a mystery of, he justly observes, ought not to be such in itself; but, on the contrary, common, obvious, and easy to be conceived. It is to be taken either from nature, as the heaven or stars; or from art, as painting, the compass, a mirror, or the like.

The Form of ÆNIGMAS consists in the words which, whether they be in prose or verse, contain either some description, a question, or a prosopopœia. The last kind are the most pleasing, inasmuch as they give life and action to things which otherwise have them not. To make an ænigma, therefore, two things are to be pitched on which bear some resemblance to each other, as the sun and a monarch, or a ship and a house; and on this resemblance is to be raised a superstructure of contrarieties, to amuse and perplex. It is easier to find great subjects for ænigmas in figures than in words, inasmuch as painting attracts the eye and excites the attention to discover the sense. The subjects of ænigmas in painting are to be taken either from history or fable: the composition here is a kind of metamorphosis, wherein, *e. g.* human figures are changed into trees, and rivers into metals. It is essential to ænigmas, that the history or fable under which they are presented be known to every body, otherwise it will be two ænigmas instead of one; the first of the history or fable, the second of the sense in which it is to be taken. Another essential rule of the ænigma is, that it only admits of one sense. Every ænigma which is susceptive of different interpretations, all equally natural, is so far imperfect. What gives a kind of erudition to an ænigma, is the invention of figures in situations, gestures, colours, &c. authorized by passages of the poets, the customs of artists in statues, basso-relievos, inscriptions, and medals.

As to the solution of ænigmas, it may be observed, that those expressed by figures are more difficult to explain than those consisting of words, because images may signify more things than words can; so that to fix them to a particular sense, we must apply every situation, symbol, &c. and without omitting a circumstance. As there are few persons in history or mythology without some particular character of vice or virtue, we are, before all things, to attend to this *character*, in order to divine what the figure of a person represented in a painting signifies, and to find what agreement this may have with the subject whereof we would explain it. Thus, if Proteus be represented in a picture, it may be taken to denote *inconstancy*, and applied either to a physical or moral subject, whose character is to be changeable, *e. g.* an almanack, which expresses the weather, the seasons, heat, cold, storms, and the like. The *colours* of figures may also help to unriddle what they mean; *white*, for instance, is a mark of innocence, *red* of modesty, *green* of hope, *black* of sorrow, &c. When figures are accompanied with *symbols*, they are less precarious; these being, as it were, the soul of ænigmas, and the key that opens the mystery of them.

ÆNIGMATOGRAPHY, or ÆNIGMATHOLOGY, the art of resolving or making ænigmas.

ÆNITHOLOGIUS, in *Poetry*, a verse of two dactyls and three trochæi; as *Prælia dira placent truci juventæ.*

ÆOLIÆ INSULÆ, now *Isoli Lipari*, in *Ancient Geography*, seven islands situated between Sicily and Italy; so called from Æolus, who reigned there about the time of the Trojan war. The Greeks call them *Hephæstiades;* and the Romans *Vulcaniæ*, from their fiery eruptions. They are also called *Liparæorum Insulæ*, from their principal island Lipara. Dionysius Periegetes calls them *Πλωται*, because circumnavigable.

ÆOLIAN HARP. See ACOUSTICS, and HARP.

ÆOLIC, in a general sense, denotes something belonging to Æolis.

ÆOLIC, or ÆOLIAN, in *Grammar*, denotes one of the five dialects of the Greek tongue. It was first used in Bœotia, whence it passed into Æolia, and was that which Sappho and Alcæus wrote in. The Æolic dialect generally throws out the aspirate or sharp spirit, and agrees in so many things with the DORIC dialect, that the two are usually confounded together.

The *Æolic digamma* is a name given to the letter F, which the Æolians used to prefix to words beginning with vowels, as Ϝοινος for οινος; also to insert between vowels, as οϜις for οις.

Æolic Verse, in *Prosody*, a verse consisting of an iambus or spondee; then of two anapests, separated by a long syllable; and, lastly, of another syllable: such as, *O stelliferi conditor orbis.* This is otherwise called *eulogic* verse; and, from the chief poets who used it, *Archilochian* and *Pindaric*.

ÆOLIPILE, in *Hydraulics*, is a hollow ball of metal, generally used in courses of experimental philosophy, in order to demonstrate the possibility of converting water into an elastic steam or vapour by heat. The instrument, therefore, consists of a slender neck or pipe, having a narrow orifice inserted into the ball by means of a shouldered screw. This pipe being taken out, the ball is filled almost full of water, and the pipe being again screwed in, the ball is placed on a pan of kindled charcoal, where it is well heated, and there issues from the orifice a vapour, with prodigious violence and great noise, which continues till all the included water is discharged. The stronger the fire is, the more elastic and violent will be the steam; but care must be taken that the small orifice of the pipe be not by any accident stopped up, because the instrument would in that case infallibly burst in pieces, with such violence as might greatly endanger the lives of the persons near it. Another way of introducing the water is to heat the ball red-hot when empty, which will drive out almost all the air; and then by suddenly immerging it in water, the pressure of the atmosphere will force in the fluid, till it is nearly full. Descartes and others have used this instrument to account for the natural cause and generation of the wind: and hence it was called *Æolipila*: q. d. *pila Æoli*, the ball of Æolus, or of the god of the winds.

ÆOLIS, or Æolia, in *Ancient Geography*, a country of the Hither Asia, settled by colonies of Æolian Greeks. Taken largely, it comprehends all Troas and the coast of the Hellespont to the Propontis, because in those parts there were several Æolian colonies. In a more limited sense it is applied to the district between Troas to the north and Ionia to the south. The people are called *Æoles* or *Æolii*.

ÆOLUS, in *Heathen Mythology*, the god of the winds, was said to be the son of Jupiter by Acasta or Sigesia, the daughter of Hippotas; or, according to others, the son of Hippotas by Menecles, daughter of Hyllus, king of Lipara. He dwelt in the island Strongyle, now called Strombolo, one of the seven islands called Æolian, from their being under the dominion of Æolus. Others say that his residence was at Rhegium, in Italy; and others, again, place him in the island Lipara. He is represented as having authority over the winds, which he held enchained in a vast cavern, to prevent their continuing the devastations they had been guilty of before they were put under his direction.

ÆON, a Greek word, properly signifying the age or duration of any thing.

Æon, among the followers of Plato, was used to signify any virtue, attribute, or perfection: hence they represented the deity as an assemblage of all possible æons, and called him *pleroma*, a Greek term signifying *fulness*. The Valentinians, who, in the first ages of the church, blended the conceits of the Jewish cabalists, the Platonists, and the Chaldean philosophers, with the simplicity of the Christian doctrine, invented a kind of Theogony, or Genealogy of Gods (not unlike that of Hesiod), whom they called by several glorious names, and all by the general appellation of Æons: among which they reckoned Ζωη, *life*; Λογος, *word*; Μονογενης, *only-begotten*; Πληρωμα, *fulness*; and many other divine powers and emanations, amounting in number to thirty; which they fancied to be successively derived from one another, and all from one self-originated deity, named *Bythus*, i. e. *profound* or *unfathomable*; whom they called likewise, *the most high and ineffable father*.

ÆORA, among ancient writers on medicine, is used for gestation; which sort of exercise was often prescribed by the physicians of those days. Other exercises consisted principally in the motion of the body; but in the *æora* the limbs were at rest, while the body was carried about and moved from place to place, in such a manner as the physician prescribed. It had therefore the advantage of exercise, without the fatigue of it. This exercise was promoted several ways; sometimes the patient was laid in a sort of hammock, supported by ropes, and moved backward and forward; sometimes his bed ran nimbly on its feet; and sometimes he was carried in a litter, in a boat or ship, or on even ground in a chariot. Asclepiades was the first who brought gestation into practice, which was used as a means to recover strength after a fever, &c.

ÆPINUS, Francis Ulrich Theodore, eminent in the mathematics, and in natural philosophy, was born at Rostock in Lower Saxony in 1724, and died at Dorpt in Livonia in 1802. We regret that our means of information do not enable us to communicate any particulars in regard to his personal history; but we shall give some account of his contributions to science; and these, after all, form the most interesting memorials of a philosopher's life.

The work by which he is best known is entitled *Tentamen Theoriæ Electricitatis et Magnetismi*, published at Petersburg in 1759. It appeared under the sanction of the Imperial Academy, to which the theory had been in part communicated; and it is said on the title-page to be *Instar Supplementi Comment. Acad. Petropolitanæ.* The work indeed merited this distinction, as being the first systematic and successful attempt to apply mathematical reasoning to the subjects of electricity and magnetism. Already the theory of Franklin with regard to the former was very generally received, and was supposed to afford a satisfactory explanation of the phenomena. But though it seemed sufficient for this purpose in the common and somewhat loose manner in which the matter had hitherto been treated, it was not certain that the same would hold when the conclusions were accurately and mathematically deduced. To apply this test was what Æpinus undertook, and what he has executed in a manner very satisfactory and complete. He has treated very fully, and perhaps has nearly exhausted, what may be called the *statics* of electricity and magnetism, or the equilibrium of their forces. A great field yet remains, where the motion of the electric fluid is to be considered, and its distribution over the surfaces of bodies of a given figure; where greater difficulties are to be encountered, and where the latest improvements of the integral calculus in the hands of Laplace and Poisson have begun to be applied. The investigations of Æpinus in their own department led to very satisfactory results, and the exact agreement between them and the phenomena actually exhibited was extensively observed. Notwithstanding this agreement, we cannot consider the theory of positive and negative electricity as being yet sufficiently established. Though the assumption on which it is founded appear very simple at first, it is found more complex on a nearer inspection. The assumption is, that a fluid resides in the surfaces of all the bodies termed electrics, which is highly elastic, and strongly attracted, at the same time, by the particles of the body; and that while this fluid remains equally diffused over the surface of the body, no phenomenon whatever gives any information of its existence. By certain mechanical operations, however, the equilibrium of this fluid may be destroyed; the fluid may be accumulated at one end, or on one side of a body, and entirely withdrawn from the opposite. It is when an electric is brought into this state that it exhibits the phenomena of electricity, between which and the calculus instituted on the suppositions just laid down, Æpinus has everywhere remarked the most exact agreement. One great difficulty, however, still remains: the negative ends of two electrified bodies repel one another just as much as the ends which are reckoned positive. But such an effect cannot result from the mere absence of a substance: when the electric fluid is withdrawn, if repulsion still continue, it must arise from the mutual action of the particles of the body itself. Thus it would appear, that, in the absence of the electric fluid, the tendency of the particles of matter is to repel one another. This is an essential part of the theory; and it is not accurate to say, that the doctrine of Franklin or Æpinus supposes no more than the existence of an elastic fluid diffused over the surfaces, and strongly attracted by the particles of bodies. It supposes, besides, that those particles, in the absence of this fluid, mutually repel one another. This not only takes away from the simplicity of the hypothesis, but it is obviously a very unnatural, not to say a contradictory supposition; because, when the electric matter is removed, how comes it to pass that the particles of the body, notwithstanding their mutual repulsion, still cohere together as firmly as before? This difficulty is acknowledged by Æpinus himself; but it would seem that the theory had taken a strong hold of his mind before he was aware of this consequence from it, so that he became by degrees reconciled to a supposition which appeared to him at first not a little incongruous. This must not surprise us: it is not always that, even among philosophers, we meet with the candour, or perhaps we should say the courage, with which Newton suspended his belief in his own great discovery, the principle of universal gravity, as long as the erroneous opinion then existing about the magnitude of the earth made the moon's motion in her orbit appear inconsistent with the descent of falling bodies.

Another remark, made by Æpinus himself, involves in it a difficulty which should have induced him to view his theory with considerable diffidence. Though he considers the difference of the two electricities to be the same as between excess and defect, or to consist in this, that the fluid which is deficient in the one part is in excess in the other, he admits that no phenomenon points out on which side the excess, or on which the defect lies. This is a strong indication that the difference is not of the kind supposed. We are not left at a loss to tell whether cold is the absence of a substance which we call heat, or heat the absence of a substance which we call cold. If there were just as much reason for asserting the one of these propositions as the other, one would certainly be inclined to reject both. The same should be done with respect to electricity and magnetism.

The investigations of Æpinus, however, are by no means rendered useless, even if the theory of positive and negative electricity, or of positive and negative magnetism, be exchanged for that of two elastic fluids, each attracting the other, and both attracted by the particles of bodies. Most of his investigations may be easily accommodated to this supposition, and, therefore, they are, fortunately for themselves and for their author, of a more permanent nature than the principles from which they were deduced.

It is to be added to this, that Æpinus was the first who saw the affinity between electricity and magnetism in its full extent, and perceived the light that these two mutually cast on one another. He instituted a regular series of experiments on the nature of the tourmaline, on which he wrote a small treatise, published in 1762. He is to be regarded also as the inventor of the condenser of electricity, and of the electrophorus, of which he gave the complete theory.

A very excellent view of the theory of Æpinus was published at Paris by M. Haüy in 1787, in 8vo. The same author has, however, adopted the theory of the two fluids in his own treatise, *Leçons de Physique*. There is a remarkable coincidence between Æpinus's work on electricity and magnetism, and that of Mr Cavendish, given in the *Philosophical Transactions* for 1771, p. 584. The principles from which they set out, and the conclusions at which they arrive, are in a great measure the same. It appears, however, quite certain, that Mr Cavendish knew nothing of the work of the Russian philosopher till his own was completed. His mode of proceeding is more geometrical, and in some parts he has gone farther.

The researches of Æpinus were not confined to the subjects now mentioned, but extended to most of the branches of natural philosophy. Beside the treatise on the tourmaline, he published, in 1762, a work, in 4to, *On the distribution of heat at the surface of the earth*; a work which, though translated into French, has hardly, we believe, made its way into this country, and of which we are therefore unable to speak from our own knowledge. He is also the author of many valuable memoirs on different subjects in pure mathematics, in astronomy, mechanics, optics, meteorology, contained in the 7th, 8th, 9th, 10th, and 12th volumes of the *Novi Commentarii Petropolitanæ*, and in the volumes of the *Berlin Memoirs* for 1755, 1756. In a memoir contained in the last of these, is the first account of his experiments on the tourmaline, which were conducted with great accuracy and judgment, and do honour to the author as a man of a sound and philosophical understanding, well instructed in the true principles of inductive investigation. Indeed, notwithstanding the objections we have made to his theories of electricity and magnetism, we must acknowledge that this is the general impression produced by the perusal of his works. He appears to have been well acquainted with practical astronomy, and sometimes to have had the charge of the imperial observatory. He made improvements on the micrometer and the reticulum, and wrote a memoir on the effects of parallax in the transit of a planet over the sun; a difficult subject, and one rendered at that time (1764) peculiarly interesting, on account of the transit of Venus which was just past, and that which was soon expected. (*Novi Com. Pet.* tom. x. p. 433.) In the same volume he has a memoir on the subject of *accidental colours*, which at that time had hardly been treated of by any author but Buffon; and another on the affinity between electricity and magnetism. In the 12th volume he notices, we believe for the first time, the electric property of the Brazilian emerald. He was not aware that this emerald is in reality the green tourmaline (*Brogniart*, tom. i. p. 418.); a variety of that mineral on which he had already exercised his ingenuity with so much success.

It is rare, in an advanced state of science, to have the satisfaction of making a new discovery with regard to a subject quite elementary, and one that has been long a subject of attention. This, however, happened to Æpinus with respect to the *lever*, and to the simplest kind of lever—that which has equal arms; of which he has demonstrated a new property, in the 8th volume of the *Commentaries* above referred to. It is this:—If a lever with equal arms be acted on at its opposite ends by forces in a given ratio to one another, and having their directions parallel to straight lines given in position; and if these forces be resolved each into two, one at right angles to the lever, and the other in the direction of it; in the case of equilibrium, the sum of the two forces, having the same direction with the lever, will be the *greatest possible*. This theorem, remarkable for its simplicity, and for illustrating the connection between the equilibrium of bodies, and certain problems concerning the maxima or minima of variable quantities, occurred when he was pursuing some of his inquiries concerning magnetism. He seems not to have been very fortunate, however, in his investigation, which is more complex than is necessary, as the proposition admits of a geometrical demonstration remarkable for its simplicity. (N.)

ÆQUIMELIUM, in *Antiquity*, a place in Rome where stood the house of Spurius Melius, who, by largesses corrupting the people, affected the supreme power. Refusing to appear before the dictator Cincinnatus, he was slain by Servilius Ahala, master of the horse; his house was razed to the ground, and the spot on which it stood was called *Area Æquimelii*. (Livy.)

ÆRA, in *Chronology*, a fixed point of time from whence any number of years is begun to be counted. It is sometimes also written in ancient authors *Era*. The origin of the term is contested, though it is generally allowed to have had its rise in Spain. Sepulveda supposes it formed from A. ER. A. the notæ or abbreviatures of the words *annus erat Augusti*, occasioned by the Spaniards beginning their computation from the time their country came under the dominion of Augustus, or that of receiving the Roman calendar. This opinion, however ingenious, is rejected by Scaliger, not only on account that in the ancient abbreviatures *A* never stood for *annus*, unless when preceded by *V* for *vixit;* but that it seems improbable they should put ER for *erat*, and the letter A, without any discrimination, both for *annus* and *Augustus*. Vossius nevertheless favours the conjecture, and judges it at least as probable as either that of Isidore, who derives *æra* from *æs*, the tribute-money wherewith Augustus taxed the world; or that of Scaliger himself, who deduces it likewise from *æs*, though in a different manner. *Æs*, he observes, was used among the ancients for an *article* or *item* in an account; and hence it came also to stand for a sum or number itself. From the plural *æra*, came by corruption *æra*, *ærum*, in the singular; much as *Ostia*, *Ostiam*, the name of a place, from *Ostia*, the mouths of the Tiber.

The difference between the terms *æra* and *epoch* is, that the æras are certain points fixed by some people or nation, and the epochs are points fixed by chronologists and historians. The idea of an æra comprehends also a certain succession of years proceeding from a fixed point of time, and the epoch is that point itself. Thus, the Christian æra began at the epoch of the birth of Jesus Christ.

ÆRARIUM, the treasury or place where the public money was deposited amongst the Romans.

Ærarium Ilithyæ, or *Junonis Lucinæ*, was where the moneys were deposited which parents paid for the birth of each child.

Ærarium Privatum was the emperor's privy purse, or the place where the money arising from his private patrimony was deposited.

Ærarium Sanctius contained the moneys arising from the twentieth part of all legacies: this was kept for the extreme necessities of the state.

Ærarium Vicesimarum, the place where the money arising from the taxes levied from foreign countries was laid up; so called because it most commonly consisted of a twentieth part of the produce.

There are several other treasuries mentioned in history, as the *Ærarium Juventutis*, *Veneris*, &c. The temple of Saturn was the public treasury of Rome, either because Saturn first taught the Italians to coin money, or, which is most likely, because this temple was the strongest and most secure, and therefore the fittest place for that purpose.

Ærarium differs from *Fiscus*, as the first contained the public money, the second that of the prince. The two are, however, sometimes indiscriminately used for each other.

ÆRARIUS, a name given by the Romans to a degraded citizen, who had been struck off the list of his century. Such persons were so called, because they were liable to all the taxes (*æra*), without enjoying any of its privileges.

The *ærarii* were incapable of making a will, of inheriting, of voting in assemblies, or of enjoying any post of honour or profit; in effect, they were only subject to the burdens, without the benefits of society; yet they retained their freedom, and were not reduced to the condition of slaves. To be made an *ærarius* was a punishment inflicted for some offence, and reputed one degree more severe than to be expelled a tribe, *tribu moveri*.

Ærarius was likewise an officer instituted by Alexander Severus, for the distribution of the money given in largesses to the soldiery or people.

Ærarius was also used for a person employed in coining or working brass. These are sometimes called *ærarii fusores*. At other times, *ærarius* is distinguished from *fusor;* the former answering to what we now call coppersmiths, the latter to founders.

Ærarius was also applied to a soldier who receives pay.

AERIA, or Eeria, in *Ancient Geography*, the ancient name of Egypt. The scholiast on Apollonius Rhodius says, that not only Thessaly, but Egypt, was called Ηερια by the Greeks, which Eusebius also confirms; and hence Apollinarius, in his translation of the 114th Psalm, uses it for Egypt. Hesychius applies this name to Ethiopia.

AERIANS, in *Church History*, a branch of Arians, who to the doctrines of that sect added some peculiar dogmas of their own; as, that there is no difference between bishops and priests,—a doctrine maintained by many modern divines, particularly of the presbyterian and reformed churches. The sect received its denomination from Aerius, an Arminian priest of the fourth century.

Flos ÆRIS, among alchemists, small scales procured from copper melted by a strong heat: it is sometimes used for ærugo or verdigris.

AERNEN, a market town near the river Rhone, in the canton of Walles or Valais, in Switzerland, in the district of Sambs. It has a state-house and other good buildings, and is the seat of justice for the district.

AEROGRAPHY, from αηρ, *air*, and γραφω, *I describe;* a description of the air or atmosphere, its limits, dimensions, properties, &c.

AEROLITE, a term recently, but perhaps improperly, applied to those singular substances commonly called Meteoric Stones.

AEROMANCY, a species of divination performed by means of air, wind, &c.

AEROMETRY, the science of measuring the air. It comprehends not only the doctrine of the air itself, considered as a fluid body, but also its pressure, elasticity, rarefaction, and condensation. But the term is at present not much in use, this branch of natural philosophy being more frequently called Pneumatics.

AERONAUTICA, from αηρ, and ναυτικος, derived from *ναυς, ship;* the art of sailing in a vessel or machine through the atmosphere, sustained as a ship in the sea. See Aeronautics.

AEROPHYLACEA, a term used by naturalists for caverns or reservoirs of air, supposed to exist in the bowels of the earth.

AERONAUTICS.

Gradual discovery of navigation.

IN every stage of society men have eagerly sought, by the combination of superior skill and ingenuity, to attain those distinct advantages which nature has conferred on the different tribes of animals, by endowing them with a peculiar structure and a peculiar force of organs. The rudest savage learns from his very infancy to imitate the swimming of a fish, and plays on the surface of the water with an agility and a perseverance which seem to decline with the advancement of civilisation. But an art so confined in its exercise, and requiring such a degree of bodily exertion, could not be considered of much avail. It was soon perceived, that the fatigue of impulsion through the water could be greatly diminished, by the support and floating of some light substance. The trunk of a tree would bear its rude proprietor along the stream; or, hollowed out into a canoe, and furnished with paddles, it might enable him even to traverse a river. From this simple fabric, the step was not great to the construction of a boat or barge, impelled by the force of oars. But it was a mighty stride to fix masts and apply sails to the vessel, and thus substitute the power of wind for that of human labour. The adventurous sailor, instead of plying on the narrow seas, or creeping timidly along the shore, could now launch with confidence into the wide ocean. Navigation, in its most cultivated form, may be fairly regarded as the consummation of art, and the sublimest triumph of human genius, industry, courage, and perseverance.

Vain attempts to fly through the air.

Having by his skill achieved the conquest of the waters that encompass the habitable globe, it was natural for man to desire likewise the mastery of the air in which we breathe. In all ages, accordingly, has ingenuity been tortured in vain efforts at flying. The story of Icarus testifies how fatal such daring attempts had generally proved to their projectors. Trials made with automatons, though less liable to risk and danger, were yet equally fallacious. Archytas, a most eminent Greek geometer and astronomer, who perished by shipwreck on the coast of Calabria, was believed by his admiring contemporaries to have constructed an artificial dove, which, by the action of a system of internal springs, wafted itself through the air. If such a piece of mechanism was ever made, we may be sure that its flight was really produced, as in the scenes of the opera, by means of invisible strings or wires.

Flying ascribed to demons,

So thoroughly were the ancients convinced of the impossibility of men being able to fly, that they ascribed the absolute rule of the sky to divinities of the first order. The supreme Jupiter alone reposed on his empyreal throne, far above the heights of Olympus; and to him was it given, from the region of the clouds, to point the winged lightning, and to hurl the flaming thunderbolt. On special missions he dispatched Mercury, as his messenger, through the wide range of atmosphere. The oriental nations, from whom we have borrowed the greater part of our vulgar mythology, likewise committed such journeys to certain genii or ministering spirits. But the glowing visions of the East received a darker tinge from the character and climate of our Gothic ancestors. The arch-fiend himself was, at no very distant period, firmly believed to have the especial control of the air, and to career in the whirlwind and impel the howling tempest. Those wretched creatures whom the unfeeling credulity of our ancestors, particularly during the prevalence of religious fanaticism, stigmatized and murdered under the denomination of witches, were supposed to work all their enchantments, to change their shapes at will, and to transport themselves through the air with the swiftness of thought, by a power immediately derived from their infernal master. At a period somewhat earlier, every person in possession of superior talents and acquirements was believed to deal in magic, and to perform his feats of skill chiefly through the secret aid granted him by the prince of darkness. In spite of the incurable perverseness of his conduct, it must be confessed that the devil has always had the credit of retaining some little inclination to assist the efforts of genius.

and to magicians.

During the darkness of the middle ages, every one at all distinguished by his knowledge in physics was generally reputed to have attained the power of flying in the air. Our famous countryman Friar Bacon, among other dreams engendered in his fervid brain, has not scrupled to claim the invention of that envied and transcendent art. To these pretensions the credulity and indulgent admiration of some authors have lent more credit than they really deserved. Any person who will take the trouble to examine the passages of Bacon's obscure though ponderous works, must soon be convinced, that the propositions advanced by him are very seldom founded on reality, but ought rather to be considered as the sportive illusions of a lively and teeming fancy. Albertus Magnus, who lived about the same period, and was esteemed in Germany as a perfect prodigy, pretended also to the art of flying. More than a century afterwards, John Müller of Königsberg, and thence styled *Regiomontanus*, one of the chief restorers of genuine mathematical learning in Europe, was reported by some writers of note to have, like Archytas, fashioned an artificial dove, which displayed its wings, and flew before the emperor Charles V. at his public entrance into Nüremburg. But, unfortunately for the veracity of the story, Regiomontanus died in early life, full sixty years before that visit took place.

Dark features of that art.

While the belief in necromancy prevailed, such tales assumed colours of the most lurid hue. Fiery dragons, created by infernal machination, were imagined to rush impetuous through the sky, vomiting flames, and widely scattering the seeds of pestilence. Grave writers, in those benighted ages, even ventured to describe the method of imitating the composition of such terrific monsters. A mass of large hollow reeds were to be disposed and bound together, then sheathed completely in skin, and smeared over with pitch and other inflammable matters: this light and bulky engine, partially set on fire, and launched in the thickest darkness into the air, might be sufficient, when borne along by the force of the wind, to strike the ignorant populace with affright and horror. But such spectacles would come to lose their terrors by repeated failure and the insensible progress of knowledge. So late as the year 1750, a small Catholic town in Swabia was almost entirely burnt to ashes by an unsuccessful experiment of that sort, instigated, and probably directed, no doubt for the edification of their flock, by the lowest order of priests. It was attempted to represent the effigy of Martin Luther, whom the monks firmly believe to be the very imp of Satan, under the form of a winged serpent, furnished with all the requisite appendages of a forked tail and hideous claws. Unluckily for the skill of the machinist, this phantom directly fell against the chimney of a house, to which it set fire; and the flames spreading furiously in every direction, the people had soon cause to lament bitterly their intemperate zeal.

Later attempts at flying.

The scheme of flying in the air, which men of the first genius had once entertained, appears to have gradually descended to a lower class of projectors. Those who afterwards occupied themselves with such hopeless attempts, had commonly a smattering of mechanics, with some little share of ingenuity, but wrought up by excessive conceit.

In the beginning of the sixteenth century, an Italian adventurer visited Scotland, during the reign of James IV.; and being a man of some address, and at the same time a pretender to alchemy, he contrived to insinuate himself into the favour of that gay and needy prince, by holding out hopes of augmenting his scanty treasury by the acquisition of the philosopher's stone. He was collated by royal favour to the abbacy of Tungland in Galloway; but not having succeeded in creating artificial riches, he resolved, in the height of his enthusiasm, at once to gratify and astonish the courtiers, by the display of a feat still more extraordinary. Having constructed a set of ample wings, composed of various plumage, he undertook, from the walls of Stirling Castle, to fly through the air to France. This experiment he had actually the folly or hardihood to try; but he soon came to the ground, and broke his thigh-bone by the violence of the fall. For his unlucky failure, however, the abbot had the dexterity to draw a very plausible excuse from the wretched sophistry, termed science in that age. "My wings," said the artful Italian, "were composed of various feathers; among them were the feathers of dunghill fowls, and they, by a certain sympathy, were attracted to the dunghill; whereas, had my wings been composed of the feathers of eagles alone, the same sympathy would have attracted them to the region of the air." This anecdote has furnished to Dunbar, the Scotish poet, the subject of one of his rude Satires.

A century afterwards, Fleyder, rector of the grammar-school at Tübingen, entertained, in 1617, the worshipful magistrates of that city with a lecture on the art of flying, which he published at the lapse of eleven years, yet prudently contented himself with barely explaining his theory. A poor monk, however, ambitious to reduce this theory into practice, having provided himself with spacious wings, took his flight from the top of a high tower; but encountering a cross wind, his machinery misgave, and falling precipitously to the ground, he broke both his legs, and perished miserably. An accident of a similar kind is related to have happened not long since near Vienna.

Impossibility of flying first demonstrated by Borelli.

The impossibility of rising, or even remaining suspended in the air, by the action of any machinery impelled by human force, was first demonstrated by Borelli, a most eminent Italian mathematician and philosopher, who lived in the fertile age of discovery, and was thoroughly acquainted with the true principles of mechanics and pneumatics. In his celebrated and excellent work *De Motu Animalium*, published in 1670, he showed, by accurate calculation, the prodigious force which the pectoral muscles of birds must exert and maintain. The same principles, applied to the structure of the human frame, proved how very disproportionate was the strength of the corresponding muscles in man. It is not, therefore, the mere difficulty of contriving and combining machinery which should perform the peculiar motions of wings, that has rendered all attempts of the kind futile, but the utter want of adequate force in the human body to give such impulsion to those extended vanes as would be necessary for supporting so great a weight in the thin medium of the atmosphere.

Having found by experience the impossibility, from any application of inherent strength, of ascending into the atmosphere, it was natural for men of ardent minds, who still pursued that dazzling project, to look for some extraneous aid among the varied powers of the elements.

Cosmological notions of the ancients.

The notions entertained by the ancients respecting the composition of the world might have suggested important hints for realizing the scheme of aërial navigation. The four elements—earth, water, air, and fire or ether, arranged according to their several qualities and tendencies, were supposed to constitute this universal frame. Earth, being heavy and inert, occupies the centre of the system, and above it flowed the waters; air, from its lightness, rose upwards, and invested the globe with an atmosphere; while the diffuse ethereal substance soared, by its extreme buoyancy, to the celestial regions, and filled with splendour their pure expanse. Every portion of these distinct elements, if transported from its place, was conceived as having a natural and constant appetency to return to its original situation. Earth and water sink downwards by their gravity, while air and fire, endued with an opposite principle, as invariably rise to the higher spaces. A portion of fire, joined to water or to air, communicates, in a corresponding degree, its levity, or disposition to ascend. Thus, warm air always rises; water, subdued by excessive heat, flies upwards in the form of vapour; and the volatile parts of inflamed bodies are borne to the sky in smoke.

Idea of sailing through the air first given by Albert of Saxony.

The first person that seems to have formed a just idea of the principle on which a balloon could be constructed was Albert of Saxony, a monk of the respectable order of St Augustin, who lived in the fourteenth century, and wrote a learned commentary on the physical works of Aristotle. Since fire is more attenuated than air, and floats above the region of our atmosphere, this ingenious person conceived that a portion of such ethereal substance, inclosed in a light hollow globe, would raise it to a certain height, and keep it suspended in the sky. But the same philosopher rightly subjoined, that a greater mixture of air introduced into the balloon, by rendering this heavier than before, would cause it to descend proportionally, in the same way precisely as water admitted through the seams of a ship makes the vessel to sink in the ocean. It is evident that nothing was wanted for completing Montgolfier's discovery, but to carry those fine views into execution.

and adopted by Mendoza

The ideas of Albert of Saxony were long afterwards zealously embraced by Francis Mendoza, a Portuguese Jesuit, who died at Lyons in the course of a tour through France in 1626, at the age of 46. He maintained that the combustible nature of fire was no real obstacle to its application in balloons, since its extreme levity, and the exclusion of the air, would hinder it from supporting inflammation.

and Casper Schott.

Casper Schott, a Jesuit likewise, pursued more soberly the same speculation in Germany. He stated that no air of these lower regions is ever light enough to produce an ascent, and that the lucid ethereal matter which swims above our atmosphere is alone fitted for aërial navigation. Were any superhuman power, therefore, to bring down a store of that buoyant substance, to be inclosed in a hollow ball of wood or thin lead, the vessel, being furnished with a rudder and sails, might then, he conceived, boldly navigate the sky.

Blended with alchemical notions.

Similar notions have been renewed at different times. They were likewise often blended with the alchemical tenets so generally received in the course of the fifteenth, sixteenth, and part of the seventeenth centuries. Conceiving with the ancients that the dew which falls during the night is of celestial origin, and shed by the stars, speculative men still imagined this pure humidity to be drawn up again to the heavens by the sun's rays in the

Whimsical projects of Father Laurus.

heat of the day. Many persons, imbued with the wretched learning of that age, had the simplicity to believe that an egg-shell filled with the morning dew, and placed at the foot of a ladder leaning against the roof of a house, would, as the day advanced, spontaneously rise along the bars, and mount to the chimney-tops. This whimsical fancy is confidently related as an observed fact by Father Lauretus Laurus. "Take," says he, very gravely, "a goose egg, and, having filled it with dew gathered fresh in the morning, expose it to the sun during the hottest part of the day, and it will ascend, and rest suspended for a few moments." To perform the experiment on a greater scale, however, he proposed to employ the largest swan's egg, or a bag artificially prepared from the thinnest and lightest skin, into which, instead of dew, he would introduce the three alchemical elements, nitre, sulphur, and mercury; and he imagined that these active bodies, expanded and sublimed by the mere heat of the sun, must spring powerfully upwards. In this way he thought the dove of Archytas might be constructed. But the visionary priest had yet another scheme to advance for effecting the ascent of the automaton: he proposed to cram the cavity of the dove with highly condensed air; and was so grossly ignorant of the principles of motion as to suppose that this imprisoned fluid would impel the machine in the same manner as wind does a sail. Should such a force be found not sufficiently efficacious, he finally recommended the application of fire; not, however, on account of its buoyant property, but because of the propulsive power which it exerts. To prevent the fire from consuming the wooden machine, he recommends lining the inside with cloth of asbestos or other incombustible materials; and to feed and support steadily this fire, he suggested a compound of butter, salts, and orpiment, lodged in metallic tubes, which he imagined would at the same time heighten the whole effect, by emitting a variety of musical tones like an organ.

Proposals of Cardan and Fabry.

Influenced by the same views, other authors, and particularly the famous Cardan, have proposed, for aërial ascents, to apply fire acting as in a rocket. Still later, but in the same country, Honoratus Fabry, penitentiary of the pope, and teacher in the gymnasium at Rome, who died about the end of the seventeenth century, described a huge apparatus, consisting of very long tin pipes, in which air was compressed by the vehement action of fire below. In a boat suspended from the machine, a man was to sit and direct the whole, by the opening or shutting of valves.

Philosophical romance of Cyrano de Bergerac.

The projects and vagaries of learned men about the misty period of the restoration of science were finely ridiculed by Cyrano de Bergerac, a very witty and eloquent French writer, in a philosophical romance, entitled *The Comical History of the States and Kingdoms in the Sun and Moon.* This eccentric genius, born at Perigord in 1620, was noted for his impetuous temper and boiling courage. He spent his youth in dissipation and feats of arms; but afterwards, in riper life, he quitted the military profession, and betook himself to the study of poetry and philosophy, which he prosecuted with great ardour and success till he died, at the early age of 35. In his romance, from which perhaps Swift borrowed the idea of Gulliver's voyage to Laputa, Bergerac introduced a good deal of the Cartesian philosophy, then just coming into vogue; but lashed severely the pedantry and ignorance of various pretenders to science. To equip himself for performing the journey to the moon, the French traveller fastens round his body a multitude of very thin flasks filled with the morning's dew. The heat of the sun, by its attractive power exerted on the dew, raised him up to the middle region of the atmosphere; where some of his flasks happening unluckily to break, the adventurer sunk again to the ground, and alighted in Canada. There he constructed a new machine, acting by a train of wheels, with which he mounted to some height; but falling down, he had the misfortune to break his leg. He crept aside, in search of ox-marrow to compose a salve, with which he instantly healed his bruises; and returning again, he found his engine in the possession of some soldiers, who had fixed to it a number of sky-rockets. Replacing himself now in the car, he applied fire to the rockets, and darted upwards with inconceivable swiftness: the earth retired gradually from view, while the orb of the moon appeared proportionally to expand, till, approaching the sphere of her activity, he was borne softly along, and descended on the lunar surface into a most delicious and luxuriant grove. Here, of course, he met with angelic personages, endowed with every perfection of body and mind, and far exalted above the mean vices and the rancorous passions which poison and inflame the inhabitants of this blood-stained globe. In the conversations which Bergerac held with those supernal beings, he was informed that a native of our planet, utterly disgusted at the crimes which pollute its "sin-worn mould," had once on a time provided himself with a pair of very large and thin metallic vessels, which he filled with smoke, and sealed in the light; and having attached himself below them, the buoyant power of the confined smoke carried him to the highest region of our atmosphere, where the attraction of the moon at length prevailing, drew him to her surface, while the great extent of the machinery, by opposing resistance, served to break the force of his fall. The moment, however, those slender capacious vessels were liberated from his weight, they rose again by the action of the smoke, till they reached a medium of the same density, and finally took their station in the bright fields of ether, where they form the constellation now called the *Balance.*

In further discourse with his sublime instructor, our romantic voyager was shewn how to obtain the power of ascension from the loadstone. He was directed to take two magnets, each about a foot square, to roast them in the fire, to separate their impurities by solution, and thus concentrate their attractive virtue in a mere calx, which could be formed into a ball. Aided by such counsels, he now resolved to visit the sun. With much labour and perseverance he constructed a chest of very thin steel, six feet high and three feet wide; an icosahedron of crystal, the highest of all the regular solids, being fitted into the top, and the bottom having a small valve which opened outwards. Into this chest he shut himself, while the sun's rays, concentrated and multiplied by reflection from the numerous facets of the crystal, heated the air intensely, and drove a great part of it out below; and he ascended rapidly towards the glorious luminary, breathing ecstaticly in divine light, which gleamed with the richest tints of enamelled gold and purple. But it would be foreign to our purpose to follow the rest of the narrative, which, though disguised and mingled with fantastic visions, evidently contains the true principles of aëronautics.

Lana's scheme for navigating the air.

The most noted and elaborate scheme for navigating the atmosphere was proposed by the Jesuit Francis Lana, in a book written in the Italian language, and printed at Brescia in 1670, with the aspiring title of *Prodromo dell' Arte Maestra.* His project was to procure four copper balls of very large dimensions, yet so extremely thin, that, after the air had been extracted, they should become, in a considerable degree, specifically lighter than the surrounding medium. He entered into some calculations to prove that the buoyant power thus obtained would be fully adequate to produce the desired effect. Yet he seems to have had only a slender knowledge of geometry, and but little acquaintance with the progress of physical science. For instance, he founds his computations entirely on the pneumatical discoveries of Galileo and Toricelli, without making any reference to those important facts which the invention of the air-pump by Otto Guericke had successively detected in the course of near 30 years. He assumes that air is 640 times lighter than water; that a cubic foot of water weighs 80 pounds, and consequently that the weight of the same bulk of air is an ounce and a half. If we rectify the estimate of Lana, and reduce it to English measures, each of his copper balls had about 25 feet in diameter, with the thickness of only the 225th part of an inch, the metal weighing 365 pounds avoirdupois, while the weight of the air which it contained must amount to 670 pounds, leaving, after a vacuum had been formed, an excess of 305 pounds, for the power of ascension. Those four balls would therefore rise together into the atmosphere with a combined force of 1220 pounds, which was thought sufficient by the projector to transport a boat completely furnished with masts, sails, oars, and rudders, and carrying several passengers. To extract the air from their cavities, the method proposed was, to procure a Toricellian vacuum, by connecting each globe, fitted with a stop-cock, to a tube of at least thirty-five feet long; the whole being filled with pure water, and raised gently into a vertical position, the mass of liquid, exceeding the pressure of the atmosphere, would flow out, and subside to some point below the cock, which could then be shut.

His calculations.

His attempts to answer objections.

Lana enumerates the different objections which might be urged against his scheme, and endeavours to answer them. He thinks that the spherical and perfectly arched form of the shell of copper would, notwithstanding its extreme thinness, enable it, after the exhaustion was effected, to sustain the enormous pressure of the external air, which, acting equally on every point of the surface, would rather tend to consolidate than to crush or tear the metal. As the atmosphere becomes always lighter in the upper regions, the machinery could only rise to a certain limit; and if this were found too high for easy breathing, the ascent could be regulated by opening occasionally the cocks to admit some air into the cavity of the balls, and thus increase their specific gravity. There seemed to him no very great difficulty in directing and impelling the aërial bark, by means of rudders, oars, and sails; but the objection was more serious on account of the hazards of tremendous shipwreck, from the violence of winds and tempests. Yet what most alarmed the insinuating Jesuit, and which he earnestly prays God to avert, was the danger that would result, from the successful practice of the art of aëronautics, to the existence of civil government, and of all human institutions. No walls or fortifications could then protect cities, which might be completely subdued or destroyed, without having the power to make any sort of resistance, by a mere handful of daring assailants, who should rain down fire and conflagration from the region of the clouds.

So sanguine was Lana, as to conceive that the very moderate sum of a hundred ducats would be sufficient to defray the expense of all this huge and delicate apparatus. But his poverty, fortunately, no doubt, for his credit as a man of learning, prevented him from proceeding further than mere speculation; and none of the foreign princes, who about that period often squandered, like gamesters, much of their wealth in the dark and chimerical search after the philosopher's stone, seemed any way disposed to engage in the magnificent scheme of aërial navigation.

The project of Lana appears to have in some degree excited the attention of the learned, though it was at the same time very generally condemned. Hooke, Borelli, Leibnitz, and Sturmius, examined it, and severely exposed its defects. Indeed, any person at all acquainted with actual experiment must see that it was absolutely impracticable. Passing over other circumstances, the attenuated shell of copper, from its size and excessive thinness, could not have strength enough to support even its own weight, far less the slightest pressure of the atmosphere. The plate, however, that Lana has given of his whole combined apparatus appears very striking; and after Montgolfier's discovery, it could not fail to attract a greater share of notice than it was otherwise entitled to claim.

Project of Galien.

So late as the year 1755, and not very long before the final invention of balloons, a very fanciful scheme, yet on the grandest scale, for navigating the atmosphere, was published with most circumstantial detail, in a small pamphlet, by Joseph Galien, a Dominican friar, and professor of philosophy and theology in the papal university of Avignon. This visionary proposed to collect the fine diffuse air of the higher regions, where hail is formed, above the summit of the loftiest mountains, and to inclose it in a bag of a cubical shape, and of the most enormous dimensions, extending more than a mile every way, and composed of the thickest and strongest sail-cloth. With such a vast machine, far outrivalling in boldness and magnitude the ark of Noah, it would be possible, he thought, to transport a whole army, and all their ammunitions of war. But we need not stop one moment to consider a project so perfectly chimerical, which involves, besides, the erroneous supposition that the air of the upper regions is, independently of its diminished compression, essentially thinner and more elastic than the air below.

It cannot fail to strike the reader, that the persons who have occupied themselves the most with attempts at aërial navigation, were all of them Catholic priests;—whether this pursuit is to be explained from their habits of seclusion and their ignorance of the affairs of real life, or from their familiar acquaintance with the relations of miracles and other legendary tales, which might lead them to see nothing very extraordinary in the art of flying through the air. The various schemes of that kind, produced at different times, contain a few just principles, generally mixed up, however, with a large portion of absurdity. But very wide is the distance from such speculations to the real exhibition of the experiment itself.

Confused ideas of Lord Bacon on aëronautics.

Some writers have stated that Lord Bacon first published the true principles of aëronautics. This round assertion we cannot help noticing, because it has really no foundation, except in the propensity, fostered by indolence, which would gladly refer all the discoveries ever made to a few great names. They mistake, indeed, the character of Bacon, who seek to represent him as an inventor. His claim to immortality rests chiefly on the profound and comprehensive views which he took of the bearings of the different parts of human knowledge; for it would be difficult to point out a single fact or observation with which he enriched the store of physical science. On the contrary, being very deficient in mathematical learning, he disregarded or rejected some of the noblest discoveries made in his own time.

We can find only two passages in Lord Bacon's works which can be considered as referring to aëronautics, and they both occur in that collection of loose facts and inconclusive reasonings which he has entitled *Natural History*. The *first* is styled *Experiment Solitary, touching Flying in the Air*, and runs thus: "Certainly many birds of good wing (as kites and the like) would bear up a good weight as they fly; and spreading feathers thin and close, and in great breadth, will likewise bear up a great weight, being even laid, without tilting up on the sides. *The further extension of this experiment might be thought upon.*" This hint is not in fairness obnoxious to stricture, since the ingenious Bishop Wilkins, twenty years afterwards, still believed that men could acquire the art of flying. Nor was there any reason to despair, till Borelli at length demonstrated its absolute impossibility.—The second passage is more diffuse, but less intelligible: it is styled *Experiment Solitary, touching the Flying of unequal Bodies in the Air.* "Let there be a body of unequal weight (as of wool and lead, or bone and lead); if you throw it from you with the light end forward, it will turn, and the weightier end will recover to be forwards, unless the body be over long. The cause is, for that the more dense body hath a more violent pressure of the parts from the first impulsion; which is the cause (though heretofore not found out, as hath been often said) of all violent motions: and when the hinder part moveth swifter (for that it less endureth pressure of parts) than the forward part can make way for it, it must needs be that the body turn over; for (turned) it can more easily draw forward the lighter part." The fact here alluded to is the resistance that bodies experience in moving through the air, which depending on the quantity of surface merely, must exert a proportionally greater effect on rare substances. The passage itself, however, after making every allowance for the period in which it was written, must be deemed confused, obscure, and unphilosophical.

True theory of balloons.

That a body must remain suspended in a fluid denser than itself, was first established by Archimedes, whose propositions in hydrostatics were further extended in modern times by Stevinus and other early mathematicians. But the principles on which a balloon could be made to rise in the atmosphere were scarcely understood till very long afterwards, when chemistry, near the latter part of the last century, had succeeded in ascertaining the properties of the different kinds of aëriform substances. The Greeks of the lower empire knew that air is greatly dilated by warmth; and Sanctorio, the ingenious medical professor at Padua, by applying this expansion, about the year 1590, to the construction of the thermometer, had happily placed it in a strong light. His countryman Borelli remarked, almost a century afterwards, that a heated iron or a burning taper brought near one of the scales of a well-poised balance, by exciting a vertical current, will cause it to mount up with force,—a fact which affords the only true explication of the numerous experiments of Buffon with the weighing of red-hot balls, whose regular and constant results appeared to that eloquent philosopher to exhibit a conclusive demonstration of the actual ponderability of heat. Yet warm air, alone and unassisted, has still no very great power of ascension. The buoyancy communicated to that fluid by the distensible vapour of water and other more volatile liquids is in some cases considerable, especially when combined at the same time with heat. But those aëriform substances which are more elastic than common air display the most steady and powerful tendency to rise in the atmosphere. Such, in a remarkable degree, is the hydrogen gas, owing probably to the expansive force communicated by the very large share of heat which is embodied with it. The late most ingenious and accurate Mr Cavendish, in 1766, found, by a nice observation, this fluid to be at least seven times lighter than atmospheric air. It therefore occurred to Dr Black of Edinburgh, that a very thin bag filled with hydrogen gas would rise to the cieling of a room. He provided, accordingly, the allantois of a calf, with the view of showing, at a public lecture, such a curious experiment before his numerous auditors; but, owing to some unforeseen accident or imperfection, it chanced to fail, and that celebrated professor, whose infirm state of health and cold or indolent temper more than once allowed the finest discoveries, when almost within reach, to escape his penetration, did not attempt to repeat the exhibition, or seek to pursue the project any farther. Several years afterwards, a similar idea occurred to Mr Cavallo, who found, however, that bladders, though carefully scraped, are too heavy, and that China paper is permeable to the gas. It is rather singular that he did not think of gold-beater's skin, which had for like purposes been recommended two centuries before by the grammarian Joseph Scaliger and some other writers. But in 1782 this ingenious person succeeded with the pretty experiment of elevating soap-bubbles, by inflating them with hydrogen gas.

Lightness of hydrogen gas found by Cavendish.

Power of ascension.

To construct an aëronautic machine, it is only required, therefore, to provide a thin bag, of sufficient capacity, and to fill it with hydrogen gas, or with air which is kept in a rarefied state. The form and strength of the material are not so essential as in Lana's project, since it here suffers an equal pressure on both its outer and its inner side. Nor is it an absolute condition that the substance of the bag should be quite impervious to the gas or confined air; though such a defect, by allowing the partial escape of the buoyant fluid, must inevitably diminish the vigour and abridge the duration of the power of the balloon's ascent. This power is evidently the excess of the weight of an equal bulk of atmospheric air above the aggregate weight of the included gas, joined to that of the bag, and of all its appendages: in other words, the final power of ascent is the difference between the weight of the included gas and of that of an equal volume of external air, further diminished by the weight of the whole apparatus. But supposing the form of the balloon to remain the same, this counteracting load, as it depends on the quantity of surface contained in the bag, must be proportioned to the *square* of the diameter; whereas the difference between the internal and external volume of fluid, which constitutes the whole of the buoyant force, increases in a faster ratio, being proportioned to the capacity of the bag, or the *cube* of its diameter. It hence follows, that however small the excess may be of the specific gravity of the external air above that of the collected fluid, there must always exist some corresponding dimension which would enable a balloon to mount in the atmosphere.

The theory of aëronautics, considered in its detail, includes three distinct things: *first*, the power of a balloon to rise through the air; *second*, the velocity of its ascent; and, *third*, the stability of its suspension at any given height in the atmosphere. These points we shall examine separately.

Buoyancy of balloons

I. *The buoyant force of balloons.* Since balloons in their shape generally approach to the spherical form, it will be more convenient to ground our calculations on that figure. A globe of common air at the level of the sea, and of the mean density and temperature, is found to weigh about the 25th part of a pound avoirdupois. Consequently, if a perfect vacuum could be procured, a balloon of ten feet diameter must rise with a force of 40 pounds; one of twenty feet diameter, with that of 320 pounds; and a balloon of thirty feet in diameter would mount in the atmosphere with the power of 1080 pounds:—thus augmenting always in the ratio of the cube of the diameters. But air expands by heat about the 450th part

from heat;

of its bulk for each degree on Fahrenheit's scale. Supposing, therefore, that the air included within the bag were heated 50 degrees, which is as much perhaps as could be well supported, it would follow that one ninth part of this fluid would be driven out by the warmth, and consequently, that the tendency of the balloon to rise upwards would be equal only to the ninth part of the entire power of ascension. Were it possible to maintain a heat of 75 degrees within the balloon, the buoyant force would yet not exceed the sixth part of the absolute ascensional power.

from humidity;

The dilatation which the presence of humidity communicates to air will, during fine weather in this climate, amount generally to one eighteenth part, though it may sometimes reach to more than the double of this quantity. But, in the tropical regions, such dilatation will commonly exceed the twentieth part of the volume of fluid. Hence moist air thrown into a bag, likewise wetted, and sufficiently large, would cause it to rise in the atmosphere. To succeed, however, in this way, the balloon constructed of coarse linen would require enormous dimensions; not less than three hundred feet in diameter.

from heat joined to moisture.

But it is the union of heat and moisture that gives to air the greatest expansion. The white smoke with which the balloons are filled on Montgolfier's plan, was found, by computation, to be at least one-third specifically lighter than the external air. This purer sort of smoke is scarcely any thing but air itself charged with vapour, being produced by the burning of chopped straw or vine twigs in a brasier, under the orifice of the bag. It would have required no fewer than 150 degrees of heat alone to cause the same extent of rarefaction.

Smoke balloons.

We have therefore sufficient data for calculating the buoyant force of the common fire, or rather smoke balloons. This force, being estimated about 12½ pounds avoirdupois when the diameter of the bag is ten feet, would amount to 1562½ pounds if the diameter were fifty feet, and to 12,500 pounds if it were a hundred feet. The weight of the linen case may be reckoned at two-fifths of a pound for a sphere of one foot in diameter. Consequently, a balloon of ten feet diameter would, without its appendages, weigh 40 pounds; one of fifty feet diameter, 1000 pounds; and one of a hundred feet diameter, 4000 pounds. Such a balloon of ten feet diameter would need 27½ pounds to make it rise, but one of fifty feet diameter would ascend with a force of 562½ pounds, and one of a hundred feet diameter would exert an ascending power of not less than 8500 pounds. There is besides to be deducted the weight of the cordage, the car, the ballast, and the passengers. It would require, on these estimates, a diameter of 33¼ feet, to procure merely an equilibrium between the weight of the canvass and the buoyant force of the rarefied air.

The hydrogen gas obtained from the action of dilute sulphuric acid upon iron filings is only six times lighter than atmospheric air; but the gas evolved during the solution of zinc in that acid is not less than twelve times lighter than the standard fluid. The ordinary way of examining the specific gravity of the different gases requires a very delicate operation of weighing with the most exquisite balance; a serious difficulty, which long retarded our knowledge of their comparative densities. In one of the notes to his *Treatise on Heat*, Professor Leslie has pointed out a very simple method, founded on the principles of pneumatics, for discovering the relative specific gravities of the aëriform fluids. This consists in observing the time that a given portion of the gas, under a determinate pressure, takes to escape through a very small aperture. The density of the gaseous fluid must be inversely as the square of the interval elapsed. Thus, the hydrogen gas procured from zinc, but without any depuration, was found, under a pressure of the same column of water, to flow thrice as fast as atmospheric air. This experiment is very striking, and requires no more apparatus than a cylindrical glass jar, open below, and surmounted by a cap terminating in a fine tubular orifice.

Balloons with hydrogen gas.

On a very moderate supposition, therefore, and after making every allowance for imperfect operation, we may consider the hydrogen gas which fills a balloon as six times lighter than the like bulk of common air. Consequently, such a balloon must exert five-sixths of the whole buoyant force corresponding to its capacity, or will have a tendency to mount in the atmosphere, that is equal to the thirtieth part of a pound avoirdupois for a globe of one foot diameter. A spherical balloon of fifteen feet diameter would hence have a buoyancy of 112½ pounds; one of thirty feet, 900 pounds; and one of sixty feet no less than 7200 pounds. But thin silk, varnished with caoutchouc or elastic gum, to render it impervious to air, is found to weigh only the twentieth part of a pound when formed into a globe of one foot diameter. A silk balloon of fifteen feet diameter would hence weigh 11¼ pounds; one of thirty feet, 45 pounds; and one of sixty feet diameter, 180 pounds. Wherefore, the power of ascension exerted by such balloons would, in pounds avoirdupois, be respectively 101¼, 855, and 7020. It follows, also, that a balloon of a foot and a half in diameter would barely float in the atmosphere, the weight of its varnished silk being then exactly balanced by the buoyant effort of the body of hydrogen gas.

But the calculations now given would in strictness require a small modification. The weight of the bag and of all the appendages must evidently compress the included gas, and thereby render it in some degree denser. To compute this minute effect, we have only to consider, that the pressure of a column of atmosphere, at the mean temperature, and near the level of the sea, is 1632 pounds, on a circle of a foot diameter. Thus, in the large balloon of sixty feet diameter, if we suppose the whole load to have been 6000 pounds, the compression of the bag would only amount to five-thirds of a pound for each circle of a foot diameter in the horizontal section, or correspond to the 979th part of the entire pressure of the atmosphere. But the weight of the confined gas being 1200 pounds, its buoyancy must have suffered a diminution of somewhat more than a pound, or $\frac{1}{11}$ from the encumbrance opposed to it. This correction is therefore a mere theoretical nicety, which may be totally disregarded in practice.

Celerity of the ascent of balloons.

II. The next circumstance to be considered in aëronautics is, *the celerity with which balloons make their ascent.* It is obvious that the efficient power of ascension, or the excess of the whole buoyant force above the absolute weight of the apparatus, would, by acting constantly, produce always an accelerated motion. But this acceleration is very soon checked, and a uniform progress maintained, by the increasing resistance which the huge mass must experience in its passage through the air. The velocity which a balloon would gain from unobstructed acceleration must, from the theory of dynamics, be to that which a falling body acquires in the same time, as the efficient buoyancy is to the aggregate weight of the apparatus and of the contained fluid. Thus, if the balloon were to rise with a force equal to the eighth part of its compound weight, the celerity resulting from a constant acceleration would be expressed by multiplying four feet into the number of seconds elapsed since it was launched into the air. Its accelerating advance, however, being opposed, Terminal velocity.

the balloon may to all appearance attain, though still affected with partial oscillations, the final velocity in perhaps little more than double the time required without such obstruction.

This final velocity, or the velocity at which the ascent becomes uniform, the resistance from the air being then equal to the efficient buoyancy of the balloon, is easily calculated. The resistance a circle encounters in moving through any fluid in the direction perpendicular to its plane, is measured by the weight of a column of that fluid, having the circle for its base, and an altitude equal to the height from which a heavy body in falling would acquire the given celerity. But near the level of the sea, and at the mean temperature, a column of atmospheric air 17 feet high, and incumbent on a circle of one foot diameter, weighs a pound avoirdupois; which is therefore the resistance that such a circle would suffer if carried forwards with the celerity of 33 feet each second. According to the same theory, however, which we owe to the sagacity of Newton, the resistance of a sphere is just the half of that of its generating circle, and consequently a velocity of $46\frac{2}{3}$ feet in a second through the air would, in ordinary cases, create a resistance of one pound to a ball of one foot diameter. In other circumstances, the quantity of resistance must be proportional to the squares of the velocities and of the diameters. Whence, if the buoyant force were always the same, the velocity of the ascent of a balloon would be inversely as its diameter.

Example. General formula.

Suppose a balloon to have thirty feet in diameter, and an ascensional power of 100 pounds. This effort is evidently the same as the ninth part of a pound for a globe of a foot diameter, and would therefore be countervailed by the resistance corresponding to a velocity of $46\frac{2}{3}$ divided by 3, the square root of 9, or $15\frac{5}{9}$ feet each second. The balloon would therefore reach the altitude of a mile in about six minutes. Its accelerating force being only the sixteenth part of its total weight, it might have acquired the uniform motion of ascent in twenty seconds, or before it had attained the height of 200 feet. This example differs very little from reality, and the method of computation will easily be transferred to other cases.

But the resistance of the air assigned by theory is, from the circumstances omitted in the simplification of the problem, generally somewhat less than the results of observation. In low velocities this difference amounts seldom to the fifth part of the whole effect; but in the high velocities it increases considerably, exceeding even the third part in certain extreme cases. From the numerous and accurate experiments of Dr Charles Hutton, we may, however, deduce a simple formula for expressing the terminal velocity of balloons, or the celerity of their uniform ascent. Let a denote the diameter of the balloon in English feet, and f its ascensional power, measured in pounds avoirdupois; then $\frac{40}{a}\sqrt{f}$ will very nearly represent in feet the velocity each second of its regular ascent, or that velocity which would cause a resistance from the air precisely equal to the buoyant force. Or, to express the rule in words: As the diameter of the balloon in feet is to the constant number 40, so is the square root of the ascensional power in pounds to the terminal or uniform velocity of ascent each second. To illustrate the application of the formula by an easy example; suppose the balloon to have a diameter of 60 feet, with an accelerating power of 144 pounds; the corresponding rate of uniform ascent becomes $\frac{40}{60}\sqrt{144}$, or $\frac{2}{3} \times 12$, that is, 8 feet each second, or about a mile in eleven minutes.

Stability of suspension.

III. The last point which demands attention in aëronautics is, *the stability of the suspension of a balloon at any given height in the atmosphere*. The circumstances which might regulate or determine that stability, requiring some little exercise of thought, have been commonly neglected, and very seldom examined with due care. It will be proper to consider, *first*, the fire or smoke balloons, and, *secondly*, the balloons filled with hydrogen gas.

Smoke balloons.

1. The warm humified air of the balloon constructed after Montgolfier's plan suffering less external compression as it approaches the upper strata of the atmosphere, must at the same time necessarily expand, and partly escape by the orifice above the brasier. The weight of the included fluid, and that of the part expelled, constituting its buoyant force, will hence be reduced, in proportion to the diminished density of the medium in which it floats. The balloon will continue to ascend till its enfeebled buoyancy is no longer able to support the incumbent load. At the height of a mile above the surface, the power of ascension would be diminished rather more than one fifth part; but at an altitude of three miles and a half it would be reduced to one-half. At the ordinary temperature, this buoyancy would suffer a reduction of the hundredth part for each ascent of 278 feet. Resuming the data formerly stated, and supposing the balloon to have a spherical shape, its actual power of ascension, estimated in pounds avoirdupois, will be denoted by $\frac{a^3}{80}$, where a signifies the diameter in feet, or the cube of the diameter divided by the constant number 80. If $m : n$ express the ratio of atmospheric density at the surface and at any given height, then will $\frac{n}{m} \cdot \frac{a^3}{80}$ denote the diminished buoyant force at that altitude.

We shall select, for example, a balloon of 100 feet diameter, which is one of the largest dimensions ever actually constructed. Near the level of the sea, and at the ordinary temperature, its power of ascension would be 12,500 pounds; but at the height of 8000 feet, or somewhat more than a mile and a half, when the density is diminished one-fourth, or $\frac{n}{m} = \frac{3}{4}$, that power becomes reduced to $\frac{3}{4} \times 12{,}500$, or 9375 pounds, being a deficiency of 3125 pounds. On the supposition that the balloon was at first so much loaded as to rest just suspended at the ground, a ballast of 3125 pounds must have been thrown out, to make it rise to the altitude of a mile and a half. Hence also the rejection of 125 pounds would have been sufficient to give the balloon an elevation of 278 feet. For the same reason, 10 pounds of ballast heaved out would raise it 22 feet at the surface, 29 feet at the height of a mile and a half, and 44 feet at that of three miles and a half.

Balloons charged with hydrogen gas.

2. The stability of the suspension of balloons filled with hydrogen gas must depend on principles which are very different and less marked. In these aëronautic machines, after the gas has been once introduced, it is closely shut up; and therefore, having constantly the same absolute weight, it should likewise, in all situations, exert the same buoyant force. Hence, if the balloon were capable of indefinite extension, it would still continue its ascent through unbounded space. The determinate capacity of the bag alone can oppose limits to its rise in the atmosphere. The upper strata being rarer than those below, will have less power to keep any given bulk suspended; and the actual buoyancy being diminished from that cause, the balloon will find its station at a corresponding height in the diffuse medium. But this diminution of the buoyant force,

and the consequent increase in the density of the hydrogen gas, must necessarily be confined within very moderate limits, otherwise the thin silk case would be torn to shreds by the expansive efforts of the imprisoned fluid. A safety-valve is accordingly placed at the top of the balloon, calculated to give vent to the gas before the distension has become such as to endanger the bursting of the case.

should not be completely filled;

A balloon should not at first be filled completely with hydrogen gas, but allowed to begin its ascent in a flaccid state. As it mounts into the rarer atmosphere, it will gradually swell, till it has attained its full distension, when the safety valve may come to act. But such dissipation of the gas ought, by a previous arrangement, to be as much as possible avoided. If the balloon were intended to rise to the height of four miles, it would not be requisite to fill more than half its capacity with the elastic fluid. To push the charge any farther in this case, would only occasion a superfluous waste of materials. By throwing out part of his ballast, the aëronaut may raise himself higher; and by opening the valve to permit some of the imprisoned gas to escape, he may descend again: but both those expedients are attended by a wasteful expenditure of power.

unstable when flaccid.

It is evident that a balloon can have no stability of equipoise, so long as it remains in a loose or flaccid state. The slightest action would then be sufficient to make it rise or fall, since, under such circumstances, any change of its station could not in the smallest degree affect the measure of its buoyant force. The general elevation to which the balloon will ascend must be determined by its quantity of ballast, conjoined with the regulation of the safety-valve; but the strain of the silk case itself would be sufficient to confine the ascent within certain limits, and to procure the stability of the floating mass. Thus, if a balloon fully distended had yet a slight disposition to rise, the imprisoned gas, suffering more and more compression as it gradually ascends, would become proportionally denser, and therefore lose a corresponding part of its previous buoyancy. An equilibrium would hence soon obtain, which must arrest the floating machine at a determinate height in the atmosphere.

Mode of adjusting balloons.

Suppose a balloon to be capable, without any danger of bursting, of sustaining an expansion equal to the hundredth part of the elasticity of the included fluid: the whole buoyancy would, by such an alteration, be diminished one five hundredth part, or this floating machine would subside 55 feet near the surface, and sink proportionally more in the upper regions. To produce the effect, it would only be requisite to throw common air into the bag, without suffering any portion of the hydrogen gas to escape. On this principle Meusnier, an ingenious French chemist, very soon after the first discovery of balloons, proposed to regulate with nicety their ascent and position of equilibrium in the atmosphere. The mode which he suggested was, to place within the principal balloon a much smaller one, to be filled occasionally with common air by help of bellows, or emptied again by opening an exterior valve. The aëronaut would thus have it in his power, without expending the charge of hydrogen gas, either to sink gently through a short space, or to rise again at will, by inflating the inner balloon, or allowing it to collapse. The adjustment of the height of a balloon could hence be managed with great precision.

The command possessed by the aëronaut of raising or depressing his machine at pleasure, might afford him the means of influencing the direction of its course. From the various motions of the several ranges of clouds, we may infer that different currents exist at the same time in the atmosphere. The aëronaut has, therefore, in his ascent, only to seek the current best suited to his purpose, and, taking his station in that stratum, to commit his flimsy vessel to the guidance of the stream.

Futility of applying sails or rudders.

Any other attempts to direct or control the flight of a balloon are altogether fallacious. Since it is carried along with the swiftness of the wind, no rudders or sails can have any action whatever. The aëronaut might fancy himself to float in a perfect calm, unless he chances to encounter irregular currents. The application of oars may turn a balloon, but can have no sensible effect in diverting or impelling its course. How vastly disproportionate is the force of the human arm to the overwhelming pressure of the wind against so huge a machine! To adapt machinery under these circumstances would be preposterous, and to look for help from such a quarter is visionary in the extreme. It must be admitted, however, that after a balloon has once gained its station of equilibrium, or passively floats in the air, the vigorous action of broad vanes, downwards or upwards, might serve to raise or depress the machine through a small space. Thus, a vertical force, exerted equal to nine pounds, would lift a balloon of thirty feet in diameter 278 feet higher. The application of ballast is hence infinitely preferable to any such bulky and unmanageable apparatus.

The Montgolfiers actually discover the balloon.

At the period where we left our narrative, the principles on which a balloon could be constructed were therefore pretty generally known to men of science. But to reduce these principles to complete effect, was still an enterprise of the most dazzling kind. This experiment seemed unfit for a cabinet or a laboratory, and it could succeed only on a large scale, exposed to the gaze of the multitude. Without the toil of investigation, or indeed any exercise of thought, all the world might witness the result, and admire the magnificent spectacle which it would present. This triumph over matter was at length achieved by the skill and perseverance of Stephen and Joseph Montgolfier, sons of the proprietor of an extensive and very celebrated paper manufactory established at Annonay, on the banks of a rivulet which flows into the Rhone, near forty miles below Lyons. These remarkable persons, though bred in a remote provincial town, possessed in a high degree ingenuity and the spirit of observation. Without having the benefit of a liberal education, their active curiosity had led them to acquire a more extensive and accurate stock of knowledge than is usually found in the same condition of life. Stephen was more attached to mathematics, but Joseph directed his studies chiefly to chemistry and natural philosophy. They were associated in business with their father, who passed his quiet days, like a patriarch, amidst a large family, and a numerous body of workmen, and reached the very advanced age of 93. Of the younger brother, who survived the other, and lived to make the very valuable yet much neglected discovery of the hydraulic ram, we may venture to speak from personal acquaintance. He was a man of great modesty and simplicity of character, yet firm and undaunted, of a calm and sedate aspect, tall and athletic in his person, and of a swarthy complexion, not unlike the celebrated Mr Watt, whom he resembled in some other particulars of his fortune. He was too speculative, perhaps, to succeed in the details of business; for, after trying various schemes of improvement, he quitted his paper manufactory and repaired to the capital, where he obtained a situation of trust under the late imperial government, at the chamber of models, as inspector of patents and internal improvements. In 1809 he had a stroke of palsy, which induced him to resort to the waters of Bourbonne; but receiving no benefit from them, he gladly preferred those of Balaruc, near his old friends, where he died on the 26th of June in the following year, at the age of 60.

Their successive experiments.

The two brothers, who were accustomed to form their plans in concert, had long contemplated the floating and ascent of clouds in the atmosphere. It seemed to them, that a sort of factitious cloud, formed of very thin vapour, inclosed in a light bag of immense size, would mount to the higher regions. In pursuit of this idea, they selected a fluid specifically lighter than atmospheric air; and, accordingly, introduced hydrogen gas into large bags of paper and of thin silk, which rose up, as had been expected, to the cieling, but fell down in a few seconds, owing to the rapid escape of the gas through the cracks and pores of the case. This great facility with which hydrogen gas makes its way through any substance of a loose and incompact texture, is partly due to its extreme fluidity, but is chiefly occasioned by its strong and obstinate attraction for common air. The mode of preventing, or at least checking that escape, by the application of a proper varnish, was yet unknown. The prospect of overcoming the difficulty was so discouraging, that our experimenters had recourse to another scheme, more analogous to their original ideas, and it rewarded their continued efforts with the most complete success. In the month of November 1782, Joseph Montgolfier, happening, in the course of his frequent excursions, to be then at Avignon, procured a small silk bag, of the form of a parallelopipedon, open below, like a lady's hoop, and having a capacity of about forty-five cubic feet; under its orifice he burnt some paper, and saw, with inexpressible transport, the bag quickly swell, and mount rapidly to the height of seventy-five feet, where it remained till by cooling it lost its buoyancy. Returning to Annonay, he communicated the happy result to his brother, and it was resolved by them to prosecute the experiment on a large scale. Having provided a large quantity of coarse linen, they formed it into the shape of a globe, about thirty feet in diameter, which they lined with paper. On lighting a fire within its cavity, to warm and expand the air, they had the delightful satisfaction of seeing the bag ascend with a force equivalent to 500 pounds.

First public ascent of a balloon.

It was very natural that the brothers should now desire an occasion for exhibiting this grand experiment in their native town. They invited the members of the provincial meeting of the states of the Vivarais, then assembled at Annonay, to witness the first public aërial ascent. On the 5th June 1783, amidst a very large concourse of spectators, the spherical bag or balloon, consisting of different pieces of linen, merely buttoned together, was suspended from cross poles; two men kindled a fire under it, and kept feeding the flames with small bundles of chopped straw; the loose bag gradually swelled, assuming a graceful form, and in the space of five minutes it was completely distended, and made such an effort to escape, that eight men were required to hold it down. On a signal being given, the stays were slipped, and the balloon instantly rose with an accelerating motion, till it reached some height, when its velocity continued uniform, and carried it to an elevation of more than a mile. All was admiration and transport. Amidst the shouts of unbounded acclamation, the progress of the artificial cloud retiring from sight arrested every eye. It was hurried along by the wind; but, its buoyant force being soon spent, it remained suspended only ten minutes, and fell gently in a vineyard, at the distance of about a mile and a half from the place of its ascension. So memorable a feat lighted up the glow of national vanity, and the two Montgolfiers were hailed and exalted by the spontaneous impulse of their fellow-citizens.

The impression made by it in Europe.

Of this splendid experiment a very hasty and imperfect account was transmitted to Paris, and quickly circulated over Europe. In those halcyon days, during the transient calm of political turmoils, and the happy absence of all military events, the prospect of navigating the atmosphere excited a very general ferment, and engrossed the conversation of all ranks. Yet the tale appeared so extraordinary as to leave some doubts of its veracity. In many places, and especially in this country, the more ignorant class of men, and those who affected superior wisdom, both agreed in considering the relation of Montgolfier's discovery as nothing but an imposition practised on the public credulity. To dispel the suspicions which infected the subject, it was necessary to repeat the experiment in every large capital.

When the intelligence of the first ascent of a balloon reached St Petersburg, it found the venerable Euler in a state of great debility, worn out with years and unremitting intellectual toil. Having lost, in the middle of his career, the sight of an eye, he had been for several years visited with total blindness. But in this afflicting situation his mind was still entire, and found delightful exercise in his former habits of calculation. It was in training a domestic to act as his amanuensis, that this great genius now condescended to dictate, in the German language, to his humble pupil, a work of the highest merit, *The Elements of Algebra*. During his last illness, Euler made an expiring effort, and applied his favourite analysis to determine the ascending motion of a balloon. He dictated the preliminary steps of the problem to one of his grandchildren: but the hand of death was already stretched over the patriarch;—no farther could he proceed with his investigation;—and composing himself for nobler scenes, he calmly expected the moment of dissolution.

Imitated at Paris.

The virtuosi at Paris were eager to repeat the experiment of the ascension of a balloon. M. Faujas de St Fond, an active and zealous naturalist, set on foot a subscription for defraying the expense, which was soon filled up. The construction of the machine was intrusted to the skill of two brothers of the name of Robert, under the superintendence of M. Charles, an ingenious lecturer in natural philosophy. It had at first been proposed merely to copy the process of Montgolfier, but Charles preferred the application of hydrogen gas; a resolution which afterwards occasioned much difficulty and delay. The balloon consisted of thin silk or tiffany, varnished with a solution of elastic gum, disposed into a globular shape, of about thirteen feet in diameter. The hydrogen gas was procured from the action of dilute sulphuric acid upon iron-filings, and was introduced through leaden pipes. But this gas, being rapidly formed, without having been made to pass through a body of cold water, entered the cavity of the balloon excessively hot, and charged with acid fumes, which afterwards condensed against the inside of the bag, injuring its texture, and loading it with superfluous humidity. Not fewer than 500 pounds of sulphuric acid were used, and twice this weight of iron-filings; yet several days were spent in abortive attempts to fill the balloon completely. At last it rose, and was kept suspended at the height of 100 feet above the ground. In this state it was conveyed with acclamations to the Place des Victoires, where it rested, and underwent some repair. About midnight it was thence transported in silent procession, preceded by torch-lights, and guarded by a detachment of horse and foot soldiers, to the Champ de Mars, at the distance of near two miles. The few passengers found at that still hour on the streets gazed with astonishment at the floating mass; and the very coachmen, filled with a sort of awe, respectfully saluted it as they passed.

Next day, being the 27th of August 1783, an immense

Balloon of Charles and Robert.

concourse of people covered the Champ de Mars, and innumerable spectators had planted themselves along the banks of the Seine and the amphitheatre of Passy. By three o'clock every avenue was filled with carriages, and all the beauty and fashion of Paris flocked towards the Ecole Militaire. The preparations being finished, a cannon was discharged as the signal of ascent. The balloon, liberated from its stays, shot upwards with such rapidity as in two minutes to reach, according to calculation, the height of 3000 feet, where it seemed lost in a dark cloud. It re-appeared at a greater elevation, but was soon obscured again amidst other clouds; and after performing a flight of about fifteen miles in the space of three quarters of an hour, it sunk to the ground in a field near Ecouen, where the peasants secured it, having noticed a rent in the upper part of the bag, to which its fall might be imputed. The success of the experiment was complete. The incredulous were sadly mortified; but every minor reflection was drowned in the tumult of excessive joy and exultation. It began to rain immediately after the balloon was launched, yet this unlucky circumstance had no effect to abate the curiosity of the spectators. Regardless of the torrents that fell, they were wholly absorbed in following with eager gaze the progress of the machine through the air. Even elegant ladies, dressed in their finest attire, stood exposed, looking intently the whole time, and were drenched to the skin. This small balloon weighed only thirty pounds, and had at first a buoyant force of forty pounds avoirdupois. If we employ the formula before given, the terminal velocity would be $\frac{40}{13}\sqrt{40} = 19\frac{6}{13}$ feet in a second, or 1168 feet each minute; which appears to correspond very well with fact.

Joseph Montgolfier constructs one of his balloons at Paris.

About this time Joseph Montgolfier visited Paris, and was invited by the Royal Academy of Sciences to repeat his experiment of Annonay on a larger scale. He constructed, with coarse linen and a paper lining, a balloon of a pear shape, and about 43 feet wide and 75 feet high. The smoke of fifty pounds of dry straw, in small bundles, joined to that of twelve pounds of wool, was found sufficient to fill it in the space of ten minutes. The bag duly swelled, and made an effort to rise equivalent to the weight of 500 pounds; but being reserved for exhibition the next day, it was totally destroyed, by its exposure during the night to incessant and violent rain. It became necessary, therefore, to prepare another balloon; and such was the expedition of the artist, that in five days he got the whole completed. Early on the morning of the 19th of September, it was placed upon an octagon scaffold, in front of the palace of Versailles. It had a very showy appearance, being painted with ornaments in oil colours. By ten o'clock the road from Paris was crowded with carriages of all descriptions. Every person of any note or fashion hurried from the metropolis to view the experiment; ladies of distinguished rank filled the windows; and the spacious courts and walks, and even the tops of the houses, were covered with impatient spectators. The royal family and their attendants came forth, and examined the details of the apparatus. About one o'clock the discharge of a mortar gave notice that the filling of the balloon was to commence. In eleven minutes another discharge announced that it was completely inflated; and on the third discharge of the mortar, the cords were cut, and the balloon instantly liberated. After balancing at first in a moment of anxious expectation to the spectators, it rose majestically, in an oblique direction, under the impulse of the wind, till it reached the height of 1500 feet, where it appeared for a while suspended; but in the space of eight minutes it dropped to the ground, at the distance of two miles from the point of its ascent. A sheep, a cock, and a duck, which had been put into the basket, the first animals ever carried up into the air, were found perfectly safe and unhurt by the journey, and the sheep even feeding at perfect ease. See Plate II. for a view of this balloon and the following ones.

This successful experiment encouraged Montgolfier to prepare, on a more solid construction, another balloon, of a spheroidal form, 45 feet wide and 75 feet high. While it was filling with smoke, Pilatre de Rozier, a young naturalist of great promise, and full of ardour and courage, leaped into the car, and was borne up to the height of 300 feet, where he continued some minutes suspended, the balloon being held down by long cords till it gently descended. The dangers of navigating the balloon being thus brought to a more correct estimate, it was resolved speedily to attempt the daring but sublime experiment. The badness of the weather, however, at this late season of the year, made the project be deferred several days. At last, on the 21st of November, every thing was ready for the ascent in the spacious gardens of the chateau of Muette, belonging to the court of the Dauphin. The sky had a lowering aspect, being loaded with heavy clouds, driven about by irregular winds. But the adventurers were not to be easily discouraged. After a first trial, which had nearly proved fatal to them, the balloon was again filled; and Rozier, with the marquis d'Arlandes, a major of infantry, who had volunteered to accompany him, took their seats in the car, having a store of ballast, and a provision of straw to supply the fire. About two o'clock the machine was launched, and it mounted with a steady and majestic pace. Wonder, mingled with anxiety, was depicted in every countenance; but when, from their lofty station in the sky, the navigators calmly waved their hats, and saluted the spectators below, a general shout of acclamation burst forth on all sides. As they rose much higher, however, they were no longer discernible by the naked eye.

Makes the first aërial voyage.

> .... in the surging smoke
> Uplifted spurn the ground; thence many a league,
> As in a cloudy chair ascending, ride
> Audacious.

This balloon soared to an elevation of more than 3000 feet, and traversed, by a circuitous and irregular course, the whole extent of Paris, whose gay inhabitants were all absorbed in admiration and amazement. A curious circumstance occurred during the passage of the floating mass: to the gazers planted on the towers of the metropolitan church of Notre Dame, it chanced to intercept the body of the sun, and thus gave them, for a few seconds, the spectacle of a total eclipse. It has been alleged, that when the balloon had reached so high that the objects on earth were no longer distinguishable, the marquis d'Arlandes began to think that his curiosity and ambition were sufficiently gratified. He was therefore anxious to descend, and murmured against his companion, who still kept feeding the fire. At last, on hearing some cracks from the top of the balloon, and observing holes burning in the sides, the major became outrageously alarmed at his imminent danger, and applying wet sponges to stop the progress of combustion, he compelled the *savant* to desist from his officious operations. As they now descended too fast, however, M. d'Arlandes was not less anxious and diligent in throwing fresh straw upon the fire, in order to gain such an elevation as would clear the different obstacles. The navigators dexterously avoided the lofty buildings of Paris, by supplying fuel as occasion required; and, after a journey of 20 or 25 minutes, they safely alighted beyond the Boulevards, having described a track of six miles.

Such was the prosperous issue of the first aërial navigation ever achieved by mortals. It was a conquest of science which all the world could understand; and it flattered extremely the vanity of that ingenious people, who hailed its splendid progress, and enjoyed the honour of their triumph. The Montgolfiers had the annual prize of six hundred livres adjudged to them by the Academy of Sciences; the elder brother was invited to court, decorated with the badge of St Michael, and received a patent of nobility; and on Joseph a pension was bestowed, with the further sum of forty thousand livres, to enable him to prosecute his experiments with balloons.

New balloon of Charles and the Roberts.

The facility and success, however, of the smoke or fire balloons appeared to throw into the shade the attempts made by the application of hydrogen gas. M. Charles, the promoter of this plan, was keenly reproached by M. Faujas de St Fond, for departing from the method practised by the original inventor; and he was, moreover, with his associates the Roberts, held up to public derision in the smaller theatres of Paris. To silence the cavils and insinuations of his antagonists, he resolved, therefore, on making some new efforts. A subscription was opened to defray the expense of a globe twenty-eight feet in diameter, and formed of tiffany, with elastic varnish. After repeated accidents and delays, this balloon was planted, on the 1st of December 1783, at the entrance of the great alley of the Tuilleries; and the diffuse fluid was this time introduced into it from a sort of gasometer. The dilute sulphuric acid and the iron-filings being put into wooden casks, disposed round a large cistern, the gas was conveyed in long leaden pipes, and made to pass through the water under a glass bell plunged in it. The whole apparatus cost about L.400 sterling, one-half of which was expended on the production of the gas alone. An immense concourse of spectators had collected from all parts. The discharge of a cannon at intervals announced the progress in filling the balloon. To amuse the populace, and quiet their impatience, M. Montgolfier was desired to let off a small fire-balloon, as a mark of his precedence. At last, the globe being sufficiently inflated, and a quantity of ballast, consisting of small sand bags, lodged in the car, leaving only 22½ pounds for the measure of the buoyant force, MM. Charles and Robert placed themselves in the appended boat or car, and the machine was immediately disengaged from its stays. It mounted with a slow and solemn motion. According to the formula given, the terminal velocity of ascension must have been only about 400 feet each minute, or at the rate of somewhat less than five miles in the hour. "The car, ascending amidst profound silence and admiration," to borrow the warm and exaggerated language of the reporter, "allowed, in its soft and measured ascent, the bystanders to follow with their eyes and their hearts two interesting men, who like demigods soared to the abode of the immortals, to receive the reward of intellectual progress, and carry the imperishable name of Montgolfier. After the globe had reached the height of 2000 feet, it was no longer possible to distinguish the aërial navigators; but the coloured pennants which they waved in the air testified their safety and their tranquil feelings. All fears were now dissipated; enthusiasm succeeded to astonishment; and every demonstration was given of joy and applause." The balloon, describing a tortuous course, and rising or sinking according to the fancy of its conductors, was, after a flight of an hour and three quarters, made to alight on the meadow of Nesle, about twenty-five miles from Paris. For the space of an hour, the buoyancy of the machine had been sensibly augmented by the sun's rays striking against the surface of the bag, and heating up the contained gas to the temperature of 55 degrees by Fahrenheit's scale.

Their ascent.

Ascent of Charles alone.

After this prosperous descent, the globe, though become rather flaccid and loose by its expenditure, yet still retained a great buoyant force when relieved from the weight of the travellers. The sun had just set, and the night was beginning to close; but M. Charles formed the resolution of making alone another aërial excursion. His courage was rewarded by the spectacle of one of the most novel and enchanting appearances in nature. He shot upwards with such celerity as to reach the height of near two miles in ten minutes. The sun rose again to him in full orb; and, from his lofty station in the heavens, he contemplated the fading luminary, and watched its parting beams, till it once more sunk below the remote horizon. The vapours rising from the ground collected into clouds, and covered the earth from his sight. The moon began to shine, and her pale rays scattered gleams of various hues over the fantastic and changing forms of those accumulated masses. This scene had all the impressive solemnity of the true sublime. No wonder that the first mortal eye that ever contemplated such awful grandeur could not refrain from shedding tears of joy and admiration. The region in which M. Charles hovered was now excessively cold; and as he opened the valve occasionally during his ascent, to prevent the violent distension of the balloon, the hydrogen gas, not having time to acquire the temperature of the exterior air, rushed out like misty vapour, with a whistling noise. But prudence forbade the voyager to remain long at such an elevation, while darkness was gathering below. He therefore descended slowly to the earth, and, after the lapse of 35 minutes, alighted near the wood of Tour du Lay, having, in that short interval, travelled about nine miles.

This balloon, with its passengers and ballast, weighed at first 680 pounds; but, notwithstanding the care taken in filling it, the hydrogen gas must have been mixed with a large proportion of common air, since it was only 5¼ times lighter than this fluid. The barometer, which stood at 29·24 English inches at the surface of the ground, subsided to 20·05 at the greatest elevation to which M. Charles had reached. This gives by calculation an altitude of 9770 feet. The thermometer, which was at 41° by Fahrenheit's scale at the first ascent, fell to 21° at the highest flight; giving a difference of one degree for every 488½ feet of ascent.

Ascent of Montgolfier at Lyons.

The next voyage through the air was performed in the largest balloon ever yet constructed. The elder Montgolfier had been persuaded to open a subscription at Lyons for the sum of L.180 sterling, to construct an aëronautic machine capable of upholding a great weight, and of carrying a horse or other quadruped. It had an elongated shape, 109 feet wide and 134 feet high, and was formed of two folds of linen, having three layers of paper laid between them, and quilted over with ribands. It showed at first enormous buoyant power. A truss of straw, moistened with spirit of wine, was found, when set on fire, to yield humid smoke sufficient to inflate the balloon, and the burning of five pounds weight of alder faggots kept it in full action. Though loaded with a ballast of eighteen tons, it yet lifted up six persons from the ground. Unfortunately, it was very much damaged one night, in consequence of being exposed to rain, frost, and snow. However, on the 19th of January 1784, the balloon was charged in seventeen minutes, by the combustion of 550 pounds of alder. Joseph Montgolfier, accompanied by the ardent Pilatre de Rozier, and four other persons of note, with the proper ballast, took their seats in a wicker gallery, and were launched into the atmosphere. They manœuvred over the city of Lyons, and near the course of the Rhine, for the space of forty minutes; but a large rent having been observed in the upper part of the balloon, they were compelled to descend abruptly, though without any further accident.

The difficulties and dangers of aërial navigation being at length surmounted, the ascents of balloons were now multiplied in all quarters. It will therefore be sufficient henceforth to notice very succinctly some of the more distinguished attempts of that kind.

Andreani.

The Chevalier Paul Andreani of Milan had a spherical balloon, of 70 feet in diameter, formed after Montgolfier's plan, at his own charge, in which, accompanied by two companions, he ascended from that capital on the 25th of February 1784. The machine rose to the height of 1300 feet; but after having described, in twenty minutes, a very circuitous track, it settled upon a large tree, from which however the voyagers, by applying fresh fuel, extricated themselves, and alighted on clear ground, without receiving any hurt.

Blanchard.

On the 2d of March Blanchard, who had been for some years before occupied with the chimerical project of flying in the air, and who fancied that the same principles and contrivances might be applied to direct the motion of balloons, mounted alone, and with great intrepidity, at Paris, in a silk balloon 40 feet in diameter, constructed by subscription, and filled with hydrogen gas. He darted rapidly to the height of above a mile, and after being driven about by cross winds for an hour and three quarters, he descended in the plain of Billancourt.

On the 28th of June in the same year, an ascent was made at Lyons before the King of Sweden, who then travelled under the name of Count Haga, with a fire-balloon, having somewhat of a pear shape, and 75 feet in height.

Fleurant and Thiblé.

Two passengers, M. Fleurant and a young lady, Madame Thiblé, the first female that ever adventured on such a daring voyage, entered the car, and ascended with great velocity. In four minutes the noise of the multitude was no longer audible, and in two more the eye could not distinguish them. It was inferred, from a trigonometrical calculation, that they had reached the altitude of 13,500 feet. Their flag, with its staff of 14 pounds weight, being thrown down, took seven minutes to fall to the ground. The thermometer had dropt to 43° on Fahrenheit's scale; and to the sensation of cold which they felt was joined that of a ringing in the ears. Different currents were found to occupy distinct strata of the atmosphere; and in passing from one stratum to another, the balloon was affected by a sensible undulation. The travellers continued to feed their fire with the loppings of vines, till this provision being nearly spent, they safely alighted in a corn-field, having traversed about six miles in three quarters of an hour.

Rozier and Proust.

About a fortnight afterwards, the same prince was gratified by a more splendid ascent, commanded for his entertainment by the French monarch. A large fire-balloon, carrying the naturalists Rozier and Proust, was launched from the outer court of Versailles. It soared to the height of 12,520 feet, and might appear to float in a vast congregation of extended and towering white clouds. The thermometer stood at 21° of Fahrenheit, and the flakes of snow fell copiously on the voyagers, while it only rained below. Descending again from that chaotic abyss, they were charmed with the lively aspect of a rich and populous district. They alighted at the entrance of the forest of Chantilly, about thirty-six miles from Versailles, after a flight of an hour and five minutes.

We omit the relation of a prosperous ascent performed at Rhodés on the 6th of August, by the Abbé Carnus and his companion, with a fire-balloon, of a globular shape, and 57 feet in diameter.—The longest aërial journey yet made was accomplished at Paris, on the 19th of September. The duke de Chartres, afterwards Orleans, and the noted Egalité, employed Robert to construct for him a silk balloon, which should be filled with hydrogen gas. It had 56 feet in height and 36 feet diameter, being composed of a cylinder terminated by two hemispheres; a construction which was rightly supposed to give much additional solidity to the machine. A small bag, on Meusnier's plan, had been introduced within it, and the boat was, besides, furnished with a helm and four oars. This balloon, bearing the duke himself, the two artists, and another companion, and having 500 pounds of ballast, was allowed to rise very slowly, with a buoyancy of only 27 pounds. At the height of 1400 feet, the voyagers perceived, not without uneasiness, thick dark clouds gathering along the horizon, and threatening the approach of a thunder-storm. They heard the distant claps, and experienced something like the agitation of a whirlwind, although they had not felt the slightest concussion in the air from the discharge of cannon. The thermometer suddenly dropped from 77° Fahrenheit to 61°; and the influence of this cold caused the balloon to descend within 200 feet of the tops of the trees near Beauvais. To extricate themselves, they now threw out more than forty pounds of ballast, and rose to an elevation of 6000 feet, where it was found that the confined gas had so obstinately retained its heat, as to be no less than 42° warmer than the external air. The duke became alarmed, and betrayed such impatience to return again to the earth, that he is said to have pierced the lower part of the silk bag in holes with his sword. After narrowly escaping the dangers from wind and thunder, the balloon at last descended in safety near Bethune, having performed a course of 135 miles in the space of five hours.

Duke of Orleans.

Guyton-Morveau.

On the 25th of April in the same year, the celebrated chemist Guyton-Morveau, with the Abbé Bertrand, ascended from Dijon in a balloon, nearly of a globular shape, 29 feet in diameter, composed of the finest varnished tiffany, and filled with hydrogen gas. They did not start till five o'clock in the evening, the barometer being at 29·3 inches, and the thermometer at 57° on Fahrenheit's scale; and, after surmounting some accidents, they rose to an altitude of 10,465 feet, or very nearly two English miles, where the barometer had sunk to 19·8 inches, and the thermometer to 25°. They felt no inconvenience, however, except from the pinching of their ears with cold. They saw an ocean of clouds below them, and in this situation they witnessed, as the day declined, the beautiful phenomenon of a parhelion, or mock sun. The real luminary was only ten degrees above the horizon, when, all at once, another sun appeared to plant itself within six degrees of the former. It consisted of numerous prismatic rings, delicately tinted, on a ground of dazzling whiteness. At half-past six o'clock, after a voyage of an hour and a half, they safely alighted near Magny, about fifteen miles distant from Dijon.

His second ascent.

With the same balloon, M. Guyton-Morveau made a second ascent on the 12th of June, accompanied by the President De Virly. It was launched at seven o'clock in the morning, the barometer being then at 29·5 inches, the thermometer at 66°, and Saussure's hygrometer at 81½°. It swelled very fast, however, owing to the effect of the sun's increasing heat; and the upper valve being at intervals opened, to give vent to excess of the gas, this escaped with a noise like the rushing of water. As the voyagers did not mount to any very great elevation, they enjoyed an agreeable temperature, and could easily, by observing the situation of the different villages scattered below them, trace out their tortuous route on the surface of the map. By nine o'clock they had reached the height of 6030 feet, the barometer now standing at 24·7 inches, the thermometer at 70°, and the hygrometer at 65½. Three quarters of an hour afterwards they descended at the village of Etevaux, only twelve miles from Dijon, having described at least double this distance in the air. The heat had increased so much since the morning, that, notwithstanding the loss of elastic fluid, the balloon seemed yet nearly inflated on touching the ground.

Remarkable voyage of Testu.

An aërial voyage, most remarkable for its duration and its adventures, was performed on the 18th of June 1786, from Paris, by M. Testu, with a balloon 29 feet in diameter, constructed by himself, of glazed tiffany, furnished with auxiliary wings, and filled, as usual, with hydrogen gas. It had been much injured by wind and rain during the night before its ascension; but having undergone a slight repair, it was finally launched, with its conductor, at four o'clock in the afternoon. The barometer then stood at 29·68 inches, and the thermometer as high as 84°, though the day was cloudy and threatened rain. The balloon had at first been filled only five-sixths, but it gradually swelled as it became drier and warmer, and acquired its utmost distension at the height of 2800 feet. But, to avoid the waste of gas or the rupture of the silk, the navigator endeavoured to descend by the re-action of his wings. Though this force had little efficacy, yet at half-past five o'clock he softly alighted on a corn-field in the plain of Montmorency. Without leaving the car, he began to collect a few stones for ballast; when he was surrounded by the proprietor of the field and a troop of peasants, who insisted on being indemnified for the damage occasioned by his idle and curious visitors. Anxious now to disengage himself, he persuaded them that, his wings being broken, he was wholly at their mercy. They seized the stay of the balloon, which floated at some height, and dragged their prisoner through the air in a sort of triumph towards the village. But M. Testu, finding that the loss of his wings, his cloak, and some other articles, had considerably lightened the machine, suddenly cut the cord, and took an abrupt leave of the clamorous and mortified peasants. He rose to the region of the clouds, where he observed small frozen particles floating in the atmosphere. He heard thunder rolling beneath his feet, and, as the coolness of the evening advanced, the buoyant force diminished, and, at three quarters after six o'clock, he approached the ground near the abbey of Royaumont. There he threw out some ballast, and in the space of twelve minutes rose to a height of 2400 feet, where the thermometer was only 66 degrees. He now heard the blast of a horn, and descried huntsmen below in full chace. Curious to witness the sport, he pulled the valve, and descended, at eight o'clock, between Etouen and Varville, when, rejecting his oars, he set himself to gather some ballast. While he was thus occupied, the hunters galloped up to him. He mounted a third time, and passed through a dense body of clouds, in which thunder followed lightning in quick succession.

> With fresh alacrity and force renew'd,
> Springs upward, like a pyramid of fire,
> Into the wild expanse, and through the shock
> Of fighting elements, on all sides round
> Environ'd wins his way.

The thermometer fell to 21°, but afterwards regained its former point of 66°, when the balloon had reached the altitude of 3000 feet. In this region the voyager sailed till half-past nine o'clock, at which time he observed from his "watch-tower in the sky" the final setting of the sun. He was now quickly involved in darkness, and enveloped in the thickest mass of thunder-clouds. The lightnings flashed on all sides, and the loud claps were incessant. The thermometer, seen by the help of a phosphoric light which he struck, pointed at 21°, and snow and sleet fell copiously around him. In this most tremendous situation the intrepid adventurer remained the space of three hours, the time during which the storm lasted. The balloon was affected by a sort of undulating motion upwards and downwards, owing, he thought, to the electrical action of the clouds. The lightning appeared excessively vivid, but the thunder was sharp and loud, preceded by a sort of crackling noise. A calm at last succeeding, he had the pleasure to see the stars, and embraced this opportunity to take some necessary refreshment. At half-past two o'clock the day broke in; but his ballast being nearly gone, and the balloon again dry and much elevated, he resolved to descend to the earth, and ascertain to what point he had been carried. At a quarter before four o'clock, having already seen the sun rise, he safely alighted near the village of Campremi, about 63 miles from Paris.

Balloons in England.

At this period, ascents with balloons had been multiplied, not only through France, but all over Europe. They were very seldom, however, directed to any other object than amusement, and had soon degenerated into mere exhibitions for gain. The first balloon seen in England was constructed by an ingenious Italian, the Count Zambeccari. It consisted of oiled silk, in a globular shape, about ten feet in diameter, and weighed only eleven pounds. It was entirely gilt, which not only gave it a beautiful appearance, but rendered it less permeable to the gas. On the 25th of November 1783 it was filled about three-fourths, and launched at one o'clock from the artillery ground, and in the presence of a vast concourse of spectators. At half-past three in the afternoon it was taken up at Petworth, in Sussex, about the distance of 48 miles.

Zambeccari.

It was not till the following year, on the 21st of September, that a countryman of his, named Lunardi, first mounted in a balloon at London. He afterwards repeated the experiment in different parts of England, and during the following year in Scotland. This active person took an expeditious but careless method of filling his balloon with gas. He had two large casks, sunk into the ground for their better security, in which he deposited 2000 pounds of the borings of cannon, divided by layers of straw, to present a larger surface. An equal weight of sulphuric acid, or common oil of vitriol, diluted with six times as much water, was poured upon the iron, and the hydrogen gas now formed, without being cooled or washed, was immediately introduced into the balloon. To Lunardi succeeded Blanchard, who possessed just as little science, but had greater pretensions, and some share of dexterity and skill. This adventurer is said to have performed not fewer than thirty-six voyages through the air, and to have acquired a large sum of money by those bold and attractive exhibitions. His most remarkable journey was across the British Channel, in company with Dr Jeffries, an American physician. On the 7th of January 1785, in a clear frosty day, the balloon was launched from the cliff of Dover, and, after a perilous course of two hours and three quarters, it alighted in safety on the edge of the forest of Guiennes, not far beyond Calais. By the magistrates of this town were the two aërial travellers treated with the utmost kindness and hospitality; and their wondrous arrival was welcomed as a happy omen, alas! how fallacious, of the lasting harmony to subsist between rival nations, now cemented by the conclusion of the famous Commercial Treaty.

Lunardi.

Blanchard.

The original smoke balloon of Montgolfier appears to have gradually fallen into disrepute, and the more elegant and expensive, but far more powerful construction, which employs varnished silk to contain hydrogen gas, came to be generally preferred. With due precaution and management, the sailing through the atmosphere is perhaps scarcely more dangerous now than the navigating of the ocean. Of some hundred ascents made at different times with balloons, not above two or three cases are recorded to have had a fatal termination. The first was rendered memorable by the shocking death of the accomplished and interesting Rozier, who perished a martyr to his ardent zeal for the promotion of science. Being anxious to return the visit which Blanchard and Jeffries had paid to the French coast, by crossing the channel again and descending in England, he transported his balloon, which was of a globular shape, and forty feet in diameter, to Boulogne; and after various delays, occasioned chiefly by adverse winds, he mounted on the 15th June 1785, with his companion M. Romain. From some vague idea of being better able to regulate the ascent of the balloon, he had most incautiously suspended below it a small smoke one of ten feet diameter; a combination to which may be imputed the disastrous issue. Scarcely a quarter of an hour had elapsed, when the whole apparatus, at the height of above three thousand feet, was observed to be on fire; and its scattered fragments, with the unfortunate voyagers, were precipitated to the ground. They fell near the sea-shore, about four miles from Boulogne, and were instantly killed by the tremendous crash, their bodies being found most dreadfully mangled. The next fatal accident with balloons happened in Italy, several years later, when a Venetian nobleman and his lady, after having performed successfully various ascents, fell from a vast height, and perished on the spot.

Shocking fate of Rozier and Romain.

The Parachute.

Balloonists have no doubt been often exposed, in their aërial excursions, to the most imminent hazard of their lives. The chief danger consists in the difficulty of preventing sometimes a rapid and premature descent. To guard, in some degree, against the risks arising from the occurrence of such accidents, the *Parachute* was afterwards introduced; being intended to enable the voyager, in case of alarm, to desert his balloon in mid-air, and drop, without sustaining injury, to the ground. The French language, though not very copious, has yet supplied this convenient term, signifying *a guard for falling*, as it has likewise furnished the words of analogous composition, *parapluie*, *paravent*, and *parasol*, to denote *an umbrella*, *a door-screen*, and *a shade for the sun*. The *parachute* very much resembles the ordinary umbrella, but has a far greater extent. The umbrella itself, requiring such strength to bear it up against a moderate wind, might naturally have suggested the application of the same principle to break the force of a fall. Nothing was required but to present a surface having dimensions sufficient to experience from the air a resistance equal to the weight of descent, in moving through the fluid with a velocity not exceeding that of the shock which a person can sustain without any danger. Accordingly, in the East, where the umbrella, or rather the parasol, has been from the remotest ages in familiar use, this implement appears to be occasionally employed by vaulters, for enabling them to jump safely from great heights. Father Loubere, in his curious account of Siam, relates that a person, famous in that remote country for his dexterity, was accustomed to divert exceedingly the king and the royal court by the prodigious leaps which he took, having two umbrellas with long slender handles fastened to his girdle. He generally alighted on the ground, but was sometimes carried by the wind against trees or houses, and not unfrequently into the river. Not many years since, the umbrella was, at least on one occasion, employed in Europe with similar views, but directed to a very different purpose. In the early part of the campaign of 1793, the French general Bournonville, having been sent by the National Convention, with four more commissioners, to treat with the Prince of Saxe-Cobourg, was, contrary to the faith or courtesy heretofore preserved in the fiercest wars that have raged among civilized nations, detained a prisoner with his companions, and sent to the fortress of Olmutz, where he suffered a rigorous confinement. In this cruel situation he made a desperate attempt to regain his liberty. Having provided himself with an umbrella, he jumped from a window at the height of forty feet; but being a very large heavy man, this screen proved insufficient to check his precipitate descent. He struck against the opposite wall, fell into the ditch, and broke his leg, and was carried in this condition back again to his dungeon.

First used.

Garnerin's descent.

Blanchard was the first who constructed parachutes, and annexed them to balloons, for the object of effecting his escape in case of accident. During the excursion which he undertook from Lisle, about the end of August 1785, when this adventurous aëronaut traversed, without halting, a distance not less than 300 miles, he let down a dog from a vast height in the basket of a *parachute*, and the poor animal, falling gently through the air, reached the ground unhurt. Since that period the practice and management of the *parachute* have been carried much farther by other aërial travellers, and particularly by M. Garnerin, who has dared repeatedly to descend from the region of the clouds with that very slender machine. This ingenious and spirited Frenchman visited London during the short peace of 1802, and made two fine ascents with his balloon, in the second of which he threw himself from an amazing elevation with a parachute. This consisted of thirty-two gores of white canvass formed into a hemispherical case of twenty-three feet diameter, at the top of which was a truck or round piece of wood ten inches broad, and having a hole in its centre, admitting short pieces of tape to fasten it to the several gores of the canvass. About four feet and a half below the top, a wooden hoop of eight feet in diameter was attached by a string from each seam; so that when the balloon rose, the parachute hung like a curtain from this hoop. Below it was suspended a cylindrical basket covered with canvass, about four feet high, and two and a quarter wide. In this basket the aëronaut, dressed in a close jacket and a pair of trousers, placed himself, and rose majestically from an inclosure near North Audley Street at six o'clock in the evening of the 2d of September. After hovering seven or eight minutes in the upper region of the atmosphere, he meditated a descent in his parachute. Well might he be supposed to linger there in dread suspense, and to

> ……………………………………… look a while
> Pondering his voyage; for no narrow frith
> He had to cross……………
> He views the breadth, and, without longer pause,
> Downright into the world's first region throws
> His flight precipitant, and winds with ease,
> Through the pure marble air, his oblique way.

He cut the cord by which his parachute was attached to the net of the balloon; it instantly expanded, and for some seconds it descended with an accelerating velocity, till it became tossed extremely, and took such wide oscillations that the basket or car was at times thrown almost into a horizontal position. Borne along likewise by the influence of the wind, the parachute passed over Mary-le-bone and Somers-town, and almost grazed the houses of St Pancras. At last it fortunately struck the ground in a neighbouring field; but so violent was the shock as to throw poor Garnerin on his face, by which accident he received some cuts, and bled considerably. He seemed to be much agitated, and trembled exceedingly at the moment he was released from the car. One of the stays of the parachute had chanced to give way; which untoward circumstance deranged the apparatus, disturbed its proper balance, and threatened the adventurer, during the whole of his descent, with immediate destruction. The feeling of such extreme peril was too much for human nature to bear.

Theory of the parachute.

From the principles before explained, we may easily determine the descent of a parachute. When, with its attached load, it is abandoned in the air, it must, from the continued action of gravity, proceed at first with an accelerated motion, till its increasing velocity comes to oppose a resistance equal to the force of attraction, or to the combined weight of the whole apparatus. After this counterpoise has taken place, there existing no longer any cause of acceleration, the parachute should descend uniformly with its acquired rapidity. This perfect equilibrium will not, however, be attained at once. The accumulation of swiftness produced by the unceasing operation of gravity, is not immediately restrained by the corresponding increased resistance of the atmosphere. The motion of a parachute must hence, for some short time, be subject to a sort of interior oscillation, alternately accelerating and retarding. It first shoots beyond the terminal velocity, and then, suffering greater resistance, it relaxes, and contracts within the just limits. This unequal and undulating progress which a parachute exhibits subsequently to the commencement of its fall, is calculated to excite disproportionate alarms of insecurity and danger.

Rate of its descent.

The terminal velocity of a parachute, or the uniform velocity to which its motion tends, would, according to theory, be equal, if its surface were flat, to the velocity that a heavy body must acquire in falling through the altitude of a column of air incumbent on that surface, and having, under the usual circumstances, the same weight as the whole apparatus. But we have already seen, that a cylinder of air, one foot in diameter and height, weighs only, in ordinary cases, the seventeenth part of a pound avoirdupois. Wherefore, if the square of the diameter of a parachute be divided by 17, the quotient will give the number of pounds equivalent to the weight of an atmospheric column of one foot; and the weight of the apparatus being again divided by this quotient, the result will express the entire altitude of an equiponderant column. Of this altitude, the square root multiplied by 8 will denote the final velocity, or that with which the parachute must strike the ground. Suppose, for example, that the diameter of the parachute were 25 feet: then $25 \times 25 = 625$; and this, divided by 17, gives $36\frac{13}{17}$. Consequently, if the parachute with its load weighed only $36\frac{13}{17}$ pounds, the shock received at the surface of the earth would be precisely the same as that which is felt in dropping from an elevation of one foot. Had the weight of the apparatus, therefore, been four times greater, or $147\frac{1}{17}$ pounds, the shock sustained would be the same as that from a fall of four feet; which is near the limit, perhaps, of what a person can bear without suffering injury from the violence of concussion. The velocity of descent, on this latter supposition, would be $8\sqrt{4}$, or sixteen feet each second.

Correct formula.

But the actual resistance of the air is rather greater than what theory would give; and it is besides augmented by the concavity of the opposing surface, which occasions an accumulation of the fluid. Let a denote the diameter of a parachute, and f the total weight of the apparatus abandoned to its gravity in the atmosphere; if we take Dr Hutton's valuable experiments for the basis of the calculation, the terminal velocity of descent may be expressed in round numbers, by $\frac{26}{a}\sqrt{f}$, in feet each second, and consequently the length of fall which would occasion the same shock, is $\left(\frac{13}{4a}\right)^2.f$, or very nearly $\frac{10\frac{1}{2}}{a^2}.f$. Thus, if the parachute had thirty feet in diameter, and weighed, together with its appended load, 225 pounds; then $\frac{26}{30}\sqrt{225} = \frac{26}{30} \times 15 = \frac{13}{15} \times 15 = 13$ feet, or the velocity with which it would strike the ground; and $\left(\frac{13}{120}\right)^2 225 = 2\frac{5}{8}$ feet, being the height from which a person dropping freely would receive the same shock.

Celerity in the higher regions.

Since the resistance which air opposes to the passage of a body is diminished by rarefaction, it is evident, that the parachute disengaged from a balloon, in the more elevated regions of the atmosphere, will at first acquire a greater velocity than it can afterwards maintain as it approaches the ground. Resuming the notation employed before, the ratio of the density of the air at the surface, and at any given height, being expressed by $n : m$; then the velocity of counterpoise at that elevation would be $\frac{26}{a}\sqrt{\frac{m}{n}.f}$, or it would be equal to what is accumulated in falling freely a height of $\frac{10\frac{1}{2}}{a^2}.\frac{m}{n}.f$ feet. It is the final velocity, however, that must be chiefly considered in parachutes, being what determines the shock sustained in alighting. The violence of the rushing through the air will seldom be attended with any serious inconvenience. If we suppose the mean velocity with which a parachute descends to be twelve feet each second, this will correspond to the rate of a mile in $7\frac{1}{3}$ minutes; not more than that of a very gentle trot. We are not told from what height Garnerin dropped; but if he took four minutes in his descent, it was probably about half a mile.

The practice of aëronautics has not realized those expectations of benefit to mankind which sanguine projectors were at first disposed to entertain. It was soon found, that a balloon, launched into the atmosphere, is abandoned, without guidance or command, to the mercy of the winds. To undertake to direct or impel the floating machine by any exertion of human strength, was evidently a chimerical attempt. All the influence which the aëronaut really possesses consists in a very limited power of raising or depressing it, according to circumstances. He cannot hope to shape his course, unless by skilfully adapting his elevation to catch the prevailing currents.

Balloons used in war.

Almost the only purpose to which balloons have hitherto been applied with success, had for its object that of military *reconnoissance*. In the early part of the French revolutionary war, when ingenuity and science were so eagerly called into active service, a balloon, prepared under the direction of the *Aërostatic Institute* in the Polytechnic School, and intrusted to the command of two or three experienced officers, was distributed to each of the republican armies. The decisive victory which General Jourdan gained, in June 1794, over the Austrian forces in the plains of Fleurus, has been ascribed principally to the accurate information of the enemy's movements before and during the battle, communicated by telegraphical signals from a balloon which was sent up to a moderate height in the air. The aëronauts, at the head of whom was the cele-

Method of filling them.

brated Guyton-Morveau, mounted twice in the course of that day, and continued, about four hours each time, hovering in the rear of the army at an altitude of 1300 feet. In the second ascent, the enterprise being discovered by the enemy, a battery was opened against them; but they soon gained an elevation above the reach of the cannon. Another balloon, constructed by the same skilful artist, M. Conté, was attached to the army sent on the memorable expedition to Egypt. What service it rendered the daring invader in the wide plains and sandy deserts of Africa, we are not informed; but, after the capitulation of Cairo, it was brought back, with the remains of the army, to France, and employed in the sequel, as we shall find, more innocently in philosophical research. These balloons, being calculated for duration, were of a more solid and perfect construction than usual. Originally they were filled with hydrogen gas, obtained from the decomposition of water on a large scale. For this purpose, six iron cylinders had been fixed by masonry in a simple kind of furnace, each of their ends projecting, and covered with an iron lid. Two sets of metal tubes were also inserted, the one for conveying hot water, and the other for carrying off the gas which was formed. The cylinders being charged with iron-turnings, and brought to a red heat, the humidity was instantly converted into steam, and decomposed, the oxygen uniting with the iron, while the hydrogen gas was discharged, and made to deposit any carbonic gas that might adhere to it, by passing through a reservoir filled with caustic lye before it entered the balloon. By this method there was procured, at a very moderate expense, and in the space of about four hours, a quantity of hydrogen gas sufficient to inflate a balloon of thirty feet in diameter.

Scientific ascent of Biot and Gay-Lussac.

The ascents with balloons should appear to furnish the readiest means of ascertaining important facts in meteorology and atmospheric electricity, departments of science which are still unfortunately in their infancy. Some aëronauts have asserted that the magnetic needle ceased to traverse at very great elevations in the atmosphere; a statement which received some countenance from the observations made by Saussure on the lofty summit of the Col du Geant, where that celebrated naturalist thought he had found the magnetic virtue to be diminished one fifth part. It has been pretended by others, that the air of the higher regions is not of the same composition as at the surface of the earth, and is, independently altogether of its rarity, less fitted for the purpose of respiration. To determine these, and other relative points, was, therefore, an object interesting to the progress of physical science. A few years since, two young and ardent French philosophers, MM. Biot and Gay-Lussac, proposed to undertake an aërial ascent, in order to examine the magnetic force at great elevations, and to explore the constitution of the higher atmosphere and its electrical properties. For such a philosophical enterprise they were eminently qualified, having been educated together at the Polytechnic School, and both of them deeply versed in mathematics; the former indulging in a wide range of study, and the latter concentrating his efforts more on chemistry and its application to the arts. Their offer to government was seconded by Berthollet and Laplace, and the celebrated chemist Chaptal, then minister of the interior, gave it his patronage and warm support. The balloon which had once visited Egypt was delivered to the custody of Biot and Gay-Lussac; and the same artist who constructed it was, at the public expense, ordered to refit and prepare it under their direction. Besides the usual provision of barometers, thermometers, hygrometers, and electrometers, they had two compasses, and a dipping-needle, with another fine needle, carefully magnetized, and suspended by a very delicate silk thread, for ascertaining by its vibrations the force of magnetic attraction. To examine the electricity of the different strata of the atmosphere, they carried several metallic wires, from sixty to three hundred feet in length, and a small electrophorus feebly charged. For galvanic experiments they had procured a few discs of zinc and copper, with some frogs; to which they added insects and birds. It was also intended to bring down a portion of air from the higher regions, to be subjected to a chemical analysis; and for this purpose a flask, carefully exhausted, and fitted with a stop-cock, had been prepared.

The balloon was placed in the garden of the *Conservatoire des Arts*, or Repository of Models, formerly the Convent of St Martin; and no pains were spared by Conté in providing whatever might contribute to the greater safety and convenience of the voyagers. Every thing being now ready for their ascent, these adventurous philosophers, in the presence of a few friends, embarked in the car at ten o'clock in the morning of the 23d of August 1804. The barometer was then at 30·13 inches, the thermometer at 61·7° on Fahrenheit's scale, and Saussure's hygrometer pointed at 80·8°, or very near the limit of absolute humidity. They rose with a slow and imposing motion. Their feelings were at first absorbed in the novelty and magnificence of the spectacle which opened before them; and their ears were saluted with the buzz of distant gratulations, sent up from the admiring spectators. In a few minutes they entered the region of the clouds, which seemed like a thin fog, and gave them a slight sensation of humidity. The balloon had become quite inflated, and they were obliged to let part of the gas escape, by opening the upper valve; at the same time, they threw out some ballast, to gain a greater elevation. They now shot through the range of clouds, and reached an altitude of about 6500 English feet. These clouds, viewed from above, had the ordinary whitish appearance; they all occupied the same height, only their upper surface seemed marked with gentle swells and undulations, exactly resembling the aspect of a wide plain covered with snow.

Their experimental operations.

MM. Biot and Gay-Lussac now began their experimental operations. The magnetic needle was attracted, as usual, by iron; but they found it impossible at this time to determine with accuracy its rate of oscillation, owing to a slow rotatory motion with which the balloon was affected. In the meanwhile, therefore, they made other observations. A Voltaic pile, consisting of twenty pairs of plates, exhibited all its ordinary effects,—gave the pungent taste, excited the nervous commotion, and occasioned the decomposition of water. By rejecting some more ballast, they had attained the altitude of 8940 feet, but afterwards settled to that of 8600 feet. At this great elevation, the animals which they carried with them appeared to suffer from the rarity of the air. They let off a violet bee, which flew away very swiftly, making a humming noise. The thermometer had fallen to 56·4° by Fahrenheit, yet they felt no cold, and were, on the contrary, scorched by the sun's rays, and obliged to lay aside their gloves. Both of them had their pulses much accelerated: that of Biot, which generally beat seventy-nine times in a minute, was raised to one hundred and eleven; while the pulse of his friend Gay-Lussac, a man of a less robust frame, was heightened from sixty to eighty beats in the minute. Notwithstanding their quickened pulsation, however, they experienced no sort of uneasiness, nor any difficulty in breathing.

Magnetical observations.

What perplexed them the most was the difficulty of observing the oscillations of a delicately suspended magnetic needle. But they soon remarked, on looking attentively down upon the surface of the conglomerated clouds, that the balloon slowly revolved, first in one direction, and then returned the contrary way. Between these opposite motions there intervened short pauses of rest, which it was necessary for them to seize. Watching, therefore, the moments of quiescence, they set the needle to vibrate, but were unable to count more than five, or very rarely ten oscillations. A number of trials, made between the altitudes of 9500 and 13,000 feet, gave 7″ for the mean length of an oscillation, while at the surface of the earth it required 7$\frac{1}{20}$″ to perform each oscillation. A difference so very minute as the hundred and fortieth part could be imputed only to the imperfection of the experiment; and it was hence fairly concluded, that the force of magnetic attraction had in no degree diminished at the greatest elevation which they could reach. The direction of this force, too, seemed, from concurring circumstances, to have continued the same; though they could not depend on observations made in their vacillating car with so delicate an instrument as the dipping needle.

Birds liberated at vast heights.

At the altitude of 11,000 feet they liberated a green linnet, which flew away directly; but, soon feeling itself abandoned in the midst of an unknown ocean, it returned and settled on the stays of the balloon. Then mustering fresh courage, it took a second flight, and dashed downwards to the earth, describing a tortuous yet almost perpendicular track. A pigeon which they let off under similar circumstances afforded a more curious spectacle. Placed on the edge of the car, it rested a while, measuring as it were the breadth of that unexplored sea which it designed to traverse: now launching into the abyss, it fluttered irregularly, and seemed at first to try its wings in the thin element; till, after a few strokes, it gained more confidence, and, whirling in large circles or spirals, like the birds of prey, it precipitated itself towards the mass of extended clouds, where it was lost from sight.

It was difficult, in those lofty and rather humid regions, to make electrical observations; and the attention of the scientific navigators was besides occupied chiefly by their magnetical experiments. However, they let down from the car an insulated metallic wire of about 250 feet in length, and ascertained, by means of the electrophorus, that the upper end indicated resinous or negative electricity. This experiment was several times repeated; and it seemed to corroborate fully the previous observations of Saussure and Volta relative to the increase of electricity met with in ascending the atmosphere.

Diminution of temperature.

The diminution of temperature in the higher regions was found to be less than what is generally experienced at the same altitude on mountains. Thus, at the elevation of 12,800 feet, the thermometer was at 51° by Fahrenheit, while it stood as low as 63½° at the observatory; being only a decrement of one degree for each 1000 feet of ascent. This fact corresponds with the observations made by former aëronauts, and must have been produced, we conceive, by the operation of two distinct causes. First, the rays from the sun, not being enfeebled by passing through the denser portion of the atmosphere, would act with greater energy on the balloon and its car, and consequently affect the thermometer placed in their vicinity. Next, the warm current of air, which during the day rises constantly from the heated surface of the ground, must augment the temperature of any body which is exposed to its influence. During the night, on the contrary, the upper strata of the atmosphere would be found colder, we presume, than the general standard, owing to the copious descent of chill portions of air from the highest regions.

Hygrometric observations.

The hygrometer, or rather hygroscope, of Saussure, advanced regularly towards dryness, in proportion to the altitude which they attained. At the elevation of 13,000 feet it had changed from 80·8° to 30°. But still the conclusion, that the air of the higher strata is drier than that of the lower, we are inclined to consider as fallacious. In fact, the indications of the hygroscope depend on the relative attraction for humidity possessed by the substance employed, and the medium in which it is immersed. But air has its disposition to retain moisture always augmented by rarefaction, and consequently such alteration alone must materially affect the hygroscope. The only accurate instrument for ascertaining the condition of air with respect to dryness is founded on a property of evaporation. But we shall afterwards have occasion to discuss this subject at due length.

Their descent.

The ballast now being almost quite expended, it was resolved to descend. The aëronauts therefore pulled the upper valve, and allowed part of the hydrogen gas to escape. They dropped gradually, and when they came to the height of 4000 feet, they met the stratum of clouds, extending horizontally, but with a surface heaved into gentle swells. When they reached the ground, no people were near them to stop the balloon, which dragged the car to some distance along the fields. From this awkward and even dangerous situation they could not extricate themselves without discharging the whole of their gas, and therefore giving up the plan of sending M. Gay-Lussac alone to explore the highest regions. It has been reported that his companion M. Biot, though a man of activity and not deficient in personal courage, was so much overpowered by the alarms of their descent, as to lose for the time the entire possession of himself. The place where they alighted, at half-past one o'clock, after three hours and a half spent in the midst of the atmosphere, was near the village of Meriville, in the department of the Loiret, and about fifty miles from Paris.

It was the desire of several philosophers at Paris, that M. Gay-Lussac should mount a second time, and repeat the different observations at the greatest elevation he could attain. Experience had instructed him to reduce his apparatus, and to adapt it better to the actual circumstances. As he could only count the vibrations of the magnetic needle during the very short intervals which occurred between the contrary rotations of the balloon, he preferred one of not more than six inches in length, which therefore oscillated quicker. The dipping needle was magnetized and adjusted by the ingenious M. Coulomb. To protect the thermometer from the direct action of the sun, it was inclosed within two concentric cylinders of pasteboard covered with gilt paper. The hygrometers, constructed on Richer's mode, with four hairs, were sheltered nearly in the same way. The two glass flasks intended to bring down air from the highest regions of the atmosphere had been exhausted till the mercurial gage stood at the 25th part of an inch, and their stop-cocks were so perfectly fitted, that, after the lapse of eight days, they still preserved the vacuum. These articles, with two barometers, were the principal instruments which M. Gay-Lussac took with him. The skill and intelligence of the artist had been exerted in further precautions for the safety of the balloon.

Gay-Lussac ascends again alone.

At forty minutes after nine o'clock on the morning of the 15th of September, the scientific voyager ascended, as before, from the garden of the Repository of Models. The barometer then stood at 30·66 English inches, the thermometer at 82° by Fahrenheit, and the hygrometer at 57½°. The sky was unclouded, but misty. Scarcely had the observer reached the height of 3000 feet, when he observed spread below him, over the whole extent of the

His observations in magnetism.

atmosphere, a thin vapour, which rendered the distant objects very indistinct. Having gained an altitude of 9950 feet, he set his needle to vibrate, and found it to perform twenty oscillations in 83″, though it had taken 84·33″ to make the same number at the surface of the earth. At the height of 12,680 feet he discovered the variation of the compass to be precisely the same as below; but with all the pains he could take, he was unable to determine with sufficient certainty the dip of the needle. M. Gay-Lussac continued to prosecute his other experiments with the same diligence, and with greater success. At the altitude of 14,480 feet he found that a key, held in the magnetic direction, repelled with its lower end, and attracted with its upper end, the north pole of the needle of a small compass. This observation was repeated, and with equal success, at the vast height of 20,150 feet; a clear proof that the magnetism of the earth exerts its influence at remote distances. He made not fewer than fifteen trials at different altitudes, with the oscillations of his finely suspended needle. It was generally allowed to vibrate twenty or thirty times. The mean result gives 4·22″ for each oscillation, while it was 4·216″ at the surface of the earth; an apparent difference so extremely small, as to be fairly neglected.

Successive decrements of temperature.

During the whole of his gradual ascent, he noticed, at short intervals, the state of the barometer, the thermometer, and the hygrometer. Of these observations, amounting in all to twenty-one, he has given a tabular view. We regret, however, that he has neglected to mark the times at which they were made, since the results appear to have been very considerably modified by the progress of the day. It would likewise have been desirable to have compared them with a register noted every half hour at the Observatory. From the surface of the earth to the height of 12,125 feet, the temperature of the atmosphere decreased regularly from 82° to 47·3° by Fahrenheit's scale. But afterwards it increased again, and reached to 53·6°, at the altitude of 14,000 feet; evidently owing to the influence of the warm currents of air which, as the day advanced, rose continually from the heated ground. From that point the temperature diminished, with only slight deviations from a perfect regularity. At the height of 18,636 feet the thermometer subsided to 32·9°, on the verge of congelation; but it sunk to 14·9° at the enormous altitude of 22,912 feet above Paris, or 23,040 feet above the level of the sea, the utmost limit of the balloon's ascent.

Comparison of these observations.

From these observations no conclusive inference, we think, can be drawn respecting the mean gradation of cold which is maintained in the higher regions of the atmosphere; for, as we have already remarked, the several strata are during the day kept considerably above their permanent temperature by the hot currents raised from the surface through the action of the sun's rays. If we adopt the formula given by Professor Leslie at the end of his Elements of Geometry, which was the result of some accurate and combined researches, the diminution of temperature corresponding to the first part of the ascent, or 12,125 feet, ought to be forty degrees of Fahrenheit. It was actually 34·7°, and would no doubt have approached to 40°, if the progressive heating of the surface, during the interval of time, were taken into the account. In the next portion of the voyage, from the altitude of 14,000 to that of 18,636 feet, or the breadth of 4636 feet, the decrement of temperature according to the formula should only have been 16¼°, instead of 20·7°, which was really marked; a proof that the diurnal heat from below had not yet produced its full effect at such a great height. In the last portion of the balloon's ascent, from 18,636 feet to 22,912, a range of 4276 feet, the decrease of heat ought to be 15½°, and it was actually 18°; owing most probably to the same cause, or the feebler influence which warm currents of air from the surface exert at those vast elevations. Taking the entire range of the ascent, or 22,912 feet, the diminution of temperature according to the same formula would be for the gradation of temperature in ascending the atmosphere 85·4°. The decrease actually observed would be 67·1°, which might be raised to 80°, if we admit the very probable supposition, that the surface of the earth had become heated from 82° to 94·9° during the interval between ten o'clock in the morning and near three in the afternoon, when the balloon floated at its greatest elevation.

After making the fair allowances, therefore, on account of the operation of deranging causes, the results obtained by M. Gay-Lussac, for the gradation of temperature in the atmosphere, appear, on the whole, to agree very nearly with those derived from the formula which theory, guided by delicate experiments, had before assigned. This gradation is evidently not uniform, as some philosophers have assumed; but proceeds with augmented rapidity in the more elevated regions. The same conclusion results from a careful inspection of the facts which have been stated by other observers.

Indications of the hygrometer.

The hygrometers, during the ascent of the balloon, held a progress not quite so regular, but tending obviously towards dryness. At the height of 9950 feet they had changed from 57·5° to 62°; from which point they continued afterwards to decline, till they came to mark 27·5°, at the altitude of 15,190 feet. From this inferior limit the hygrometers advanced again, yet with some fluctuations, to 35·1°, which they indicated at the height of 18,460 feet. Above this altitude the variation was slight, though rather inclining to humidity. There can exist no doubt, however, that, allowing for the influence of the prevailing cold, the higher strata of the atmosphere must be generally drier than the lower, or capable of retaining, at the same temperature, a larger share of moisture.

Prospect of the highest atmosphere.

At the altitude of 21,460 feet M. Gay-Lussac opened one of his exhausted flasks; and, at that of 21,790 feet, the other. The air rushed into them through the narrow aperture, with a whistling noise. He still rose a little higher, but, at eleven minutes past three o'clock, he had attained the utmost limit of his ascent, and was then 22,912 feet above Paris, or 23,040 feet, being more than four miles and a quarter, above the level of the sea. The air was now more than twice as thin as ordinary, the barometer having sunk to 12·95 inches. From that stupendous altitude, sixteen hundred feet above the summit of the Andes, more elevated than the loftiest pinnacle of our globe, and far above the heights to which any mortal had ever soared, the aërial navigator might have indulged the feelings of triumphant enthusiasm. But the philosopher, in perfect security, was more intent on calmly pursuing his observations. During his former ascent, he saw the fleecy clouds spread out below him, while the canopy of heaven seemed of the deepest azure, more intense than Prussian blue. This time, however, he perceived no clouds gathered near the surface, but remarked a range of them stretching, at a very considerable height, over his head: the atmosphere, too, wanted transparency, and had a dull, misty appearance. The different aspect of the sky was probably owing to the direction of the wind, which blew from the north-north-west in his first voyage, but in his second from the south-east.

Feelings of Gay-Lussac.

While occupied with experiments at this enormous elevation, he began, though warmly clad, to suffer from excessive cold, and his hands, by continual exposure, grew benumbed. He felt likewise a difficulty in breathing, and his pulse and respiration were much quickened. His throat became so parched from inhaling the dry attenuated air, that he could hardly swallow a morsel of bread; but he experienced no other direct inconvenience from his situation. He had indeed been affected, through the whole of the day, with a slight headache, brought on by the preceding fatigues and want of sleep; but though it continued without abatement, it was not increased by his ascent.

His descent.

The balloon was now completely distended, and not more than 33 pounds of ballast remained: it began to drop, and M. Gay-Lussac, therefore, only sought to regulate its descent. It subsided very gently, at the rate of about a mile in eight minutes; and after the lapse of thirty-four minutes, or at three quarters after three o'clock, the anchor touched the ground, and instantly secured the car. The voyager alighted with great ease near the hamlet of St Gourgon, about sixteen miles north-west from Rouen. The inhabitants flocked around him, offering him assistance, and eager to gratify their curiosity.

His analysis of the air brought down.

As soon as he reached Paris, he hastened to the laboratory of the Polytechnic School, with his flasks, containing air of the higher regions, and proceeded to analyze it in the presence of Thenard and Gresset. Opened under water, the liquid rushed into them, and apparently half filled their capacity. The transported air was found, by a very delicate analysis, to contain exactly the same proportions as that collected near the surface of the earth, every 1000 parts holding 215 of oxygen. From concurring observations, therefore, we may conclude that the atmosphere is essentially the same in all situations.

Remarks on these last ascents.

The ascents performed by MM. Biot and Gay-Lussac are memorable, for being the first ever undertaken solely for objects of science. It is impossible not to admire the intrepid coolness with which they conducted those experiments, operating, while they floated in the highest regions of the atmosphere, with the same composure and precision as if they had been quietly seated in their cabinets at Paris. Their observations on the force of terrestrial magnetism show most satisfactorily its deep source and wide extension. The identity of the constitution of the atmosphere to a vast altitude was likewise ascertained. The facts noted by Gay-Lussac, relative to the state of the thermometer at different heights, appear generally to confirm the law which theory assigns for the gradation of temperature in the atmosphere: but many interesting points were left untouched by this philosopher. We are sorry that he had not carried with him the *cyanometer*, which enabled Saussure to determine the colour of the sky on the summits of the Swiss mountains. Still more we regret that he was not provided with an hygrometer and a photometer, of Leslie's construction. These delicate instruments could not have failed, in his hands, to furnish important data for discovering the relative dryness and transparency of the different strata of air. It would have been extremely interesting, at such a tremendous height, to have measured with accuracy the feeble light reflected from the azure canopy of heaven, and the intense force of the sun's direct rays, and hence to have determined what portion of them is absorbed in their passage through the lower and denser atmosphere.

Since that time numerous ascents have been performed in different countries, generally by adventurers guided by no philosophical views, nor leading to any valuable results. It would therefore be superfluous to recount such repeated attempts.

Various projects with balloons.

Balloons have at different times been thought capable of useful application. It has been even proposed to employ their power of ascension as a mechanical force. This might be rendered sufficient, it was believed, to raise water from mines, or to transport obelisks, and place them on great elevations. We can easily imagine situations where a balloon could be used with advantage; such as to raise, without any scaffolding, a cross or a vane to the top of a high spire. But the power would then be purchased at a very disproportionate expense. It would require 4½ pounds of iron, or 6 of zinc, with equal quantities of sulphuric acid, to yield hydrogen gas sufficient to raise up the weight of one pound.

The proposal of employing balloons in the defence and attack of fortified places appears truly chimerical. They have rendered important service, however, in reconnoitring the face of a country, and communicating military signals; and it is rather surprising that a system, which promised such obvious benefits, has not been carried much farther.

Their application proposed for the improvement of meteorology.

But to a skilful and judicious application of balloons, we may yet look for a most essential improvement of the infant science of meteorology. Confined to the surface of this globe, we have no direct intimation of what passes in the lofty regions of the atmosphere. All the changes of weather, which appear so capricious and perplexing, proceed, no doubt, from the combination of a very few simple causes. Were the philosopher to penetrate beyond the seat of the clouds, examine the circumstances of their formation, and mark the prevailing currents, he would probably remove in part the veil that conceals those mighty operations. It would be quite practicable, we conceive, to reach an elevation of seven miles, where the air would be four times more attenuated than ordinary. A silk balloon, of forty feet diameter, if properly constructed, might be sufficient for that enormous ascent, since its weight would only be 80 pounds, while its buoyant force, though not more than a quarter filled with hydrogen gas, would amount to 533⅓, leaving 453⅓ pounds for the passenger and the ballast. The balloon could be safely charged, indeed, to the third part of its capacity, on account of the contraction which the gas would afterwards suffer from the intense cold of the upper regions; and this gives it an additional buoyancy of 177⅞ pounds. The voyager would not, we presume, suffer any serious inconvenience from breathing the very thin air. The animal frame adapts itself with wonderful facility to external circumstances. Perhaps the quickened pulse and short respiration, which some travellers have experienced on the summits of lofty mountains, should be attributed chiefly to the suddenness of their transition, and the severity of the cold. The people of Quito live comfortably 9560 feet above the level of the sea; and the shepherds of the hamlet of Antisana, the highest inhabited spot in the known world, who breathe, at an elevation of 13,500 feet, air that has only three-fifths of the usual density, are nowise deficient in health or vigour. But the intenseness of the cold is probably what the resolute observer would have most to dread, at the height of seven miles. This decrease of temperature, perhaps equal to 148 degrees, might extend below the point at which mercury freezes. Yet several circumstances tend to mitigate such extreme cold, and proper clothing might enable an experimenter for a short time to resist its effects.

Much could be done, however, without risk or material expense. Balloons from fifteen to thirty feet in diameter, and carrying register thermometers and barometers, might be capable of ascending alone to altitudes between eight and twelve miles. Dispatched from the centres of the great continents, they would not only determine the extreme gradation of cold, but indicate by their flight the direction of the regular and periodic winds which doubtless obtain in the highest regions of the atmosphere. But we will not enlarge. In some happier times, such experiments may be performed with the zealous concurrence of different governments;—when nations shall at last become satisfied with cultivating the arts of peace, instead of wasting their energies in sanguinary, destructive, and fruitless wars. (B.)

In Plate II. there is a view of the principal balloons. The figure in the centre represents the shape of the gores for forming the cloth into a globular shape. AE, the length of the gore, is equal to the half of the circumference of the globe; BC, the breadth, is the same proportional part of the circumference as the number of gores which it requires to form the sphere. The figures between CB and A denote the breadths of the half-gore, at equal distances from the centre; the breadth BD at the centre being taken equal to 1, and the others in decimals. In this manner it is easy to construct an exact pattern of the gores, all which, being united, will form a true sphere.

AERSCHOT, a fortified city in the Netherlands, on the river Dander, 7 miles from Louvain, and 20 from Antwerp, containing 2750 inhabitants.

ÆRUGINOUS, an epithet given to such things as resemble or partake of the nature of the rust of copper.

ÆRUGO, in *Natural History*, properly signifies the rust of copper, whether natural or artificial. The former is found about copper mines, and the latter, called *verdigris*, made by corroding copper plates with acids.

ÆRUSCATORES, in *Antiquity*, a kind of strolling beggars, not unlike gypsies, who drew money from the credulous by fortune-telling, &c. It was also a denomination given to griping exactors, or collectors of the revenue. The Galli, or priests of Cybele, were called *æruscatores magnæ matris*; and *μητραγυρται*, from their begging in the streets; to which end they had little bells to draw people's attention, similar to some orders of mendicants abroad.

AERZEELE, a town of 2809 inhabitants, in the arrondissement of Kortryk, and province of West Flanders.

AERZEN, a bailiwick in the province of Kalenberg, in the kingdom of Hanover, with 1 market town, 19 villages, 852 houses, and 4895 inhabitants. The extent is about 28,400 acres. The chief town of the bailiwick has the same name. It contains 159 houses, and 901 inhabitants.

ÆS UXORIUM, in *Antiquity*, a sum paid by bachelors, as a penalty for living single to old age. This tax for not marrying seems to have been first imposed in the year of Rome 350, under the censorship of M. Furius Camillus and M. Posthumus. At the census, or review of the people, each person was asked, *Et tu ex animi sententia uxorem habes liberorum quærendorum causa?* He who had no wife was hereupon fined after a certain rate, called *æs uxorium*.

Æs per et libram was a formula in the Roman law, whereby purchases and sales were ratified. Originally the phrase seems to have been only used in speaking of things sold by weight, or by the scales; but it afterwards was used on other occasions. Hence even in adoptions, as there was a kind of imaginary purchase, the formula thereof expressed, that the person adopted was bought *per æs et libram*.

ÆSCHINES, an Athenian, a Socratic philosopher, the son of Charinus, a sausage-maker. He was continually with Socrates; which occasioned this philosopher to say, that the sausage-maker's son was the only person who knew how to pay a due regard to him. It is said that poverty obliged him to go to Sicily to Dionysius the tyrant: and that he met with great contempt from Plato, but was extremely well received by Aristippus, to whom he showed some of his dialogues, and received from him a handsome reward. He would not venture to profess philosophy at Athens, Plato and Aristippus being in such high esteem; but he opened a school, in which he taught philosophy, to maintain himself. He afterwards wrote orations for the forum. Phrynicus, in Photius, ranks him amongst the best orators, and mentions his orations as the standard of the pure Attic style. Hermogenes has also spoken very highly of him. He wrote, besides, several Dialogues, of which there are only three extant: 1. Concerning virtue, whether it can be taught. 2 Eryxias, or Erasistratus; concerning riches, whether they are good. 3. Axiochus; concerning death, whether it is to be feared. M. le Clerc has given a Latin translation of them, with notes and several dissertations, entitled *Silvæ Philologicæ*.

ÆSCHINES, a celebrated Grecian orator, was born at Athens 327 years before the Christian era. According to his own account, he was of distinguished birth; according to that of Demosthenes, he was the son of a courtesan, and a humble performer in a company of comedians. But whatever was the true history of his birth and early life, his talents, which were considerable, procured him great applause, and enabled him to be a formidable rival to Demosthenes himself. The two orators, inspired probably with mutual jealousy and animosity, became at last the strenuous leaders of opposing parties. Æschines was accused by Demosthenes of having received money as a bribe, when he was employed on an embassy to Philip of Macedon. He indirectly retaliated the charge by bringing an accusation against Ctesiphon, the friend of Demosthenes, for having moved a decree, contrary to the laws, to confer on Demosthenes a golden crown, as a mark of public approbation. A numerous assembly of judges and citizens met to hear and decide the question. Each orator employed all his powers of eloquence; but Demosthenes, with superior talents, and with justice on his side, was victorious; and Æschines was sent into exile. The resentment of Demosthenes was now softened into generous kindness; for when Æschines was going into banishment, he requested him to accept of a sum of money; which made him exclaim, "How do I regret leaving a country where I have found an enemy so generous, that I must despair of ever meeting with a friend who shall be like him!"

Æschines opened a school of eloquence at Rhodes, which was the place of his exile; and he commenced his lectures by reading to his audience the two orations which had been the cause of his banishment. His own oration received great praise, but that of Demosthenes was heard with boundless applause. In so trying a moment, when vanity must be supposed to have been deeply wounded, with a noble generosity of sentiment, he said, "What would you have thought if you had heard him thunder out the words himself."—Æschines afterwards removed to Samos, where he died in the 75th year of his age. Three of his orations only are extant. His eloquence is not without energy, but it is diffuse and ornamented, and more calculated to please than to move the passions.

ÆSCHYLUS, the tragic poet, was born at Athens. The time of his birth is not exactly ascertained. Some suppose that it was in the 65th, others in the 70th Olympiad; but according to Stanley, who follows the Arundelian marbles, he was born in the 63d Olympiad. He was the son of Euphorion, and brother to Cynægirus and Amynias, who distinguished themselves in the battle of Marathon and the sea-fight of Salamis, at which engagements Æschylus was likewise present. In this last action, according to Diodorus Siculus, Amynias, the youngest of the three brothers, commanded a squadron of ships, and fought with so much conduct and bravery, that he sunk the admiral of the Persian fleet, and signalized himself above all the Athenians. To this brother our poet was, upon a particular occasion, obliged for saving his life. Ælian relates, that Æschylus, being charged by the Athenians with certain blasphemous expressions in some of his pieces, was accused of impiety, and condemned to be stoned to death: they were just going to put the sentence in execution, when Amynias, with a happy presence of mind, throwing aside his cloak, showed his arm without a hand, which he had lost at the battle of Salamis in defence of his country. This sight made such an impression on the judges, that, touched with the remembrance of his valour, and with the friendship he showed for his brother, they pardoned Æschylus. Our poet, however, resented the indignity of this prosecution, and resolved to leave a place where his life had been in danger. He became more determined in this resolution when he found his pieces less pleasing to the Athenians than those of Sophocles, though a much younger writer. Some affirm, that Æschylus never sat down to compose but when he had drunk liberally. He wrote a great number of tragedies, of which there are but seven remaining; and notwithstanding the sharp censures of some critics, he must be allowed to have been the father of the tragic art. In the time of Thespis there was no public stage to act upon, the strollers driving about from place to place in a cart. Æschylus furnished his actors with masks, and dressed them suitably to their characters. He likewise introduced the buskin, to make them appear more like heroes. The ancients gave Æschylus also the praise of having been the first who removed murders and shocking sights from the eyes of the spectators. He is said likewise to have lessened the number of the chorus. M. Le Fevre has observed, that Æschylus never represented women in love in his tragedies, which, he says, was not suited to his genius; but in representing a woman transported with fury he was incomparable. Longinus says, that Æschylus has a noble boldness of expression, and that his imagination is lofty and heroic. It must be owned, however, that he affected pompous words, and that his sense is too often obscured by figures. This gave Salmasius occasion to say that he was more difficult to be understood than the Scripture itself. But notwithstanding these imperfections, this poet was held in great veneration by the Athenians, who made a public decree that his tragedies should be played after his death. He was killed in the 69th year of his age, by an eagle letting fall a tortoise upon his head as he was walking in the fields. He had the honour of a pompous funeral from the Sicilians, who buried him near the river Gela; and the tragedians of the country performed plays and theatrical exercises at his tomb. The best editions of Æschylus are those of Stanley, folio, Lond. 1663, with an excellent Latin translation and commentary; and of Schütz, in 3 vols. 8vo, Halle, 1782.

ÆSCULAPIUS, in the *Heathen Mythology*, the god of physic, was the son of Apollo and the nymph Coronis. He was educated by the centaur Chiron, who taught him physic, by which means Æsculapius cured the most desperate diseases. But Jupiter, enraged at his restoring to life Hippolytus, who had been torn in pieces by his own horses, killed him with a thunderbolt. According to Cicero, there were three deities of this name: the first, the son of Apollo, worshipped in Arcadia, who invented the probe and bandages for wounds; the second, the brother of Mercury, killed by lightning; and the third, the son of Arsippus and Arsinoe, who first taught the art of tooth-drawing and purging. At Epidaurus, Æsculapius's statue was of gold and ivory, with a long beard, his head surrounded with rays, holding in one hand a knotty stick, and the other entwined with a serpent: he was seated on a throne of the same materials as his statue, and had a dog lying at his feet. The Romans crowned him with laurel, to represent his descent from Apollo; and the Phliasians represented him as beardless. The cock, the raven, and the goat, were sacred to this deity. His chief temples were at Pergamus, Smyrna, Trica, a city in Ionia, and the isle of Coos; in all which votive tablets were hung up, showing the diseases cured by his assistance. But his most famous shrine was at Epidaurus, where, every five years, games were instituted to him, nine days after the Isthmian games at Corinth.

ÆSOP, the Phrygian, lived in the time of Solon, about the 50th Olympiad, under the reign of Crœsus, the last king of Lydia. As to genius and abilities, he was greatly indebted to nature; but in other respects not so fortunate, being born a slave and extremely deformed. St Jerome, speaking of him, says he was unfortunate in his birth, condition in life, and death; hinting thereby at his deformity, servile state, and tragical end. His great genius, however, enabled him to support his misfortunes; and in order to alleviate the hardships of servitude, he composed those entertaining and instructive fables which have acquired him so much reputation. He is generally supposed to have been the inventor of that kind of writing; but this is contested by several, particularly Quintilian, who seems to think that Hesiod was the first author of fables. Æsop, however, certainly improved this art to a very great degree; and hence it is that he has been accounted the author of this sort of productions:

Æsopus auctor quam materiam reperit,
Hanc ego polivi versibus senariis. PHÆD.

Mine is the task, in easy verse,
The tales of Æsop to rehearse.

The first master whom Æsop served was one Carasius Demarchus, an inhabitant of Athens; and there, in all probability, he acquired his purity in the Greek tongue. After him he had several masters, and at length came under a philosopher named Idmon or Iadmon, who enfranchised him. After he had recovered his liberty, he soon acquired a great reputation amongst the Greeks; so that, according to Meziriac, the report of his wisdom having reached Crœsus, he sent to inquire after him, and engaged him in his service. He travelled through Greece, according to the same author, whether for his own pleasure or upon the affairs of Crœsus is uncertain; and passing by Athens soon after Pisistratus had usurped the sovereign power, and finding that the Athenians bore the yoke very impatiently, he told them the fable of the frogs who petitioned Jupiter for a king. The images made use of by Æsop are certainly very happy inventions to instruct mankind: they possess all that is necessary to perfect a precept, having a mixture of the useful with the agreeable. "Æsop the fabulist," says Aulus Gellius, "was deservedly esteemed wise, since he did not, after the manner of the philosophers, rigidly and imperiously dictate such things as were proper to be advised and persuaded; but framing entertaining and agreeable apologues, he thereby charms and captivates the human mind." Æsop was put to death at Delphi. Plutarch tells us, that he came thither with a great quantity of gold and silver, being ordered by Crœsus to offer a sacrifice to Apollo, and to give a considerable sum to each inhabitant; but a quarrel arising betwixt him and the Delphians, he sent back the money to Crœsus; for he thought those for whom the prince designed it had rendered themselves unworthy of it. The inhabitants of Delphi brought an accusation of sacrilege against him; and pretending they had convicted him, threw him headlong from a rock. For this cruelty and injustice, we are told, they were visited with famine and pestilence; and consulting the oracle, they received for answer, that the god designed this as a punishment for their treatment of Æsop. They endeavoured to make an atonement, by raising a pyramid to his honour.

Æsop, *Clodius*, a celebrated actor, who flourished about the 670th year of Rome. He and Roscius were contemporaries, and the best performers who ever appeared upon the Roman stage; the former excelling in tragedy, the latter in comedy. Cicero put himself under their direction, to perfect his action. Æsop lived in a most expensive manner, and at one entertainment is said to have had a dish which cost above L.800. This dish, we are told, was filled with singing and speaking birds, some of which cost near L.50. The delight which Æsop took in this sort of birds proceeded, as M. Bayle observes, from the expense. He did not make a dish of them because they could speak, according to the refinement of Pliny upon this circumstance, this motive being only by accident, but because of their extraordinary price. If there had been any birds that could not speak, and yet more scarce and dear than these, he would have procured such for his table. Æsop's son was no less luxurious than his father, for he dissolved pearls for his guests to swallow. Some speak of this as a common practice of his; but others mention his falling into this excess only on a particular day, when he was treating his friends. Horace[1] speaks only of one pearl of great value, which he dissolved in vinegar and drank. When he was upon the stage, he entered into his part to such a degree as sometimes to be seized with a perfect ecstasy. Plutarch mentions it as reported of him, that whilst he was representing Atreus deliberating how he should revenge himself on Thyestes, he was so transported beyond himself in the heat of action, that with his truncheon he smote one of the servants crossing the stage, and laid him dead on the spot.

ÆSTIMATIO Capitis, a term met with in old law-books for a fine anciently ordained to be paid for offences committed against persons of quality, according to their several degrees.

ÆSTIVAL, in a general sense, denotes something connected with, or belonging to summer. Hence æstival sign, æstival solstice, &c.

ÆSTUARIA, in *Geography*, denotes an arm of the sea, which runs a good way within land. Such is the Bristol channel, and many of the friths of Scotland.

ÆSTUARIES, in ancient baths, were secret passages from the hypocaustum into the chambers.

ÆSTUARY, among physicians, a vapour bath, or any other instrument for conveying heat to the body.

ÆSYMNIUM, in *Antiquity*, a monument erected to the memory of the heroes by Æsymnus the Megarean. He, consulting the oracle in what manner the Megareans might be most happily governed, was answered, *If they held consultation with the more numerous;* whom he taking for the dead, built the said monument, and a senate-house that took within its compass the monument, imagining that thus the dead would assist at their consultations. (Pausanias.)

AETH, or Ath, a strong little town in the Austrian Netherlands, and province of Hainault, situated on the river Dender, about 20 miles south-west of Brussels.

ÆTHALIA, or Ilua, in *Ancient Geography*, now *Elba*, an island on the coast of Etruria, in compass a hundred miles, abounding in iron. It was so called from *αιθαλη*, *smoke*, which issued from the shops of Vulcan.

ÆTHELSTAN, see Athelstan.

ÆTHER is usually understood of a thin, subtile matter or medium, much finer and rarer than air, which, commencing from the limits of our atmosphere, possesses the whole heavenly space. The word is Greek, *αιθηρ*, supposed to be formed from the verb *αιθειν*, *to burn, to flame;* some of the ancients, particularly Anaxagoras, supposing it to be of the nature of fire.

The philosophers cannot conceive that the largest part of the creation should be perfectly void; and therefore they fill it with a species of matter under the denomination of *æther*. But they vary extremely as to the nature and character of this æther. Some conceive it as a body *sui generis*, appointed only to fill up the vacuities between the heavenly bodies, and therefore confined to the regions above our atmosphere. Others suppose it of so subtile and penetrating a nature as to pervade the air and other bodies, and to possess the pores and intervals thereof. Others deny the existence of any such specific matter, and think the air itself, by that immense tenuity and expansion it is found capable of, may diffuse itself through the interstellar spaces, and be the only matter found therein.

In effect, æther being no object of our sense, but the mere work of imagination, brought only upon the stage for the sake of hypothesis, or to solve some phenomenon real or imaginary, authors take the liberty of modifying it as they please. Some suppose it of an elementary nature, like other bodies, and only distinguished by its tenuity, and the other affections consequent thereon; which is the philosophical æther. Others will have it of another species, and not elementary, but rather a sort of fifth element, of a purer, more refined, and spiritous nature, than the substances about our earth, and void of the common affections thereof, as gravity, &c. The heavenly spaces being the supposed region or residence of a more exalted class of beings, the medium must be more exalted in proportion. Such is the ancient and popular idea of æther, or æthereal matter.

The term *æther* being thus embarrassed with a variety of ideas, and arbitrarily applied to so many different things, the later and severer philosophers choose to set it aside, and in lieu thereof substitute other more determinate ones. Thus, the Cartesians use the term *materia subtilis*, which is their æther: and Sir Isaac Newton, sometimes a *subtile spirit*, as in the close of his *Principia;* and sometimes a *subtile* or *æthereal medium*, as in his *Optics*.

Heat, Sir Isaac Newton observes, is communicated through a vacuum almost as readily as through air; but such communication cannot be without some interjacent body, to act as a medium. And such body may be subtile enough to penetrate the pores of glass, and may permeate those of all other bodies, and consequently be diffused through all the parts of space.

The existence of such an æthereal medium being settled, that author proceeds to its properties; inferring it to be not only rarer and more fluid than air, but exceedingly more elastic and active; in virtue of which properties he shows, that a great part of the phenomena of nature may be produced by it. To the weight, *e. g.* of this medium, he attributes gravitation, or the weight of all other bodies; and to its elasticity, the elastic force of the air and of nervous fibres, and the emission, refraction, reflection, and other phenomena of light; as also sensation, muscular motion, &c. In fine, this same matter seems the *primum mobile*, the first source or spring of physical action in the modern system.

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[1] *Sat.* iii. lib. ii. 230.

The Cartesian æther is supposed not only to pervade, but adequately to fill, all the vacuities of bodies; and thus to make an absolute plenum in the universe.

But Sir Isaac Newton shows that the celestial spaces are void of all sensible resistance; and hence it follows, that the matter contained therein must be immensely rare, in regard the resistance of bodies is chiefly as their density: so that if the heavens were thus adequately filled with a medium or matter, how subtile soever, they would resist the motion of the planets and comets much more than quicksilver or gold. But it has been supposed that what Newton has said of æther is to be considered only as a conjecture, and especially as no new proofs of its existence have been adduced since his time.

The late discoveries in electricity have thrown great light upon this subject, and rendered it extremely probable that the æther so often talked of is no other than the electric fluid, or solar light, which diffuses itself throughout the whole system of nature.

ÆTHEREAL, ÆTHEREUS, something that belongs to, or partakes of, the nature of ÆTHER. Thus we say, *the æthereal space, æthereal regions*, &c. Some of the ancients divided the universe, with respect to the matter contained therein, into elementary and æthereal. Under the æthereal world was included all that space above the uppermost element, viz. fire. This they supposed to be perfectly homogeneous, incorruptible, unchangeable, &c. The Chaldees placed an æthereal world between the empyreum and the region of the fixed stars. Besides which, they sometimes also speak of a second æthereal world, meaning by it the starry orb; and a third æthereal world, by which is meant the planetary region.

ÆTHIOPIA. See ABYSSINIA, and ETHIOPIA.

AETIANS, in *Church History*, a branch of Arians, who maintained that the Son and Holy Ghost are in all things dissimilar to the Father. See AETIUS.

ÆTIOLOGY is that part of pathology which is employed in exploring the causes of diseases.

AETION, a celebrated painter, who left an excellent picture of Roxana and Alexander, which he exhibited at the Olympic games. It represents a magnificent chamber, where Roxana is sitting on a bed of a most splendid appearance, which is rendered still more brilliant by her beauty. She looks downwards in a kind of confusion, being struck with the presence of Alexander standing before her. A number of little Cupids flutter about, some holding up the curtain, as if to show Roxana to the prince, whilst others are busied in undressing the lady; some pull Alexander by the cloak, who appears like a young bashful bridegroom, and present him to his mistress. He lays his crown at her feet, being accompanied by Hephæstion, who holds a torch in his hand, and leans upon a youth, who represents Hymen. Several other little Cupids are represented playing with his arms: some carry his lance, stooping under so heavy a weight; others bear along his buckler, upon which one of them is seated, whom the rest carry in triumph; another lies in ambush in his armour, waiting to frighten the rest as they pass by. This picture gained Aetion so much reputation, that the president of the games gave him his daughter in marriage.

ÆTITES, or EAGLE-STONE, in *Natural History*, a flinty or crustated stone, hollow within, and containing a *nucleus*, which, on shaking, rattles within. It was formerly in repute for several extraordinary magical as well as medical powers; such as preventing abortion, discovering thieves, and other ridiculous properties. The word is formed from *αετος*, eagle, the popular tradition being, that it is found in the eagle's nest, whither it is supposed to be carried while the female sits, to prevent her eggs from being rotten. It is found in several parts. Near Trevoux, in France, one can scarcely dig a few feet without finding considerable strata or beds of the coarser or ferruginous kind. They are originally soft, and of the colour of yellow ochre. But the finest and most valued of all the eagle-stones are accidental states of one or other of our common pebbles.

AETIUS, one of the most zealous defenders of Arianism, was born in Syria, and flourished about the year 336. After being servant to a grammarian, of whom he learned grammar and logic, he was ordained deacon, and at length bishop, by Eudoxus, patriarch of Constantinople. Aetius was banished into Phrygia on account of his religious opinions; but was recalled from exile on the accession of Julian, and was much esteemed by that emperor. He died, it is supposed, at Constantinople, about the year 366. St Epiphanius has preserved 47 of his propositions against the Trinity. His followers were called AETIANS.

AETIUS, a famous physician, born at Amida in Mesopotamia, and the author of a work entitled *Tetrabiblos*, which is a collection from the writings of those physicians who went before him. He lived, according to Dr Freind, in the end of the fifth or the beginning of the sixth century.

AETIUS, governor of Gallia Narbonensis in the reign of Valentinian III., forced the Franks who were passing into Gaul to repass the Rhine. He defeated the Goths, and routed Attila, king of the Huns, who invaded Gaul with an army of 700,000 men. But the emperor, jealous of the merit of this great man, killed him in 454, with his own hand, under the pretence that he had permitted the invasion of the Huns, after Attila's defeat.

ÆTNA, (in the Itineraries *Æthana*, supposed from *αιθω, to burn*; according to Bochart, from *athuna*, a furnace, or *ætuna*, darkness), now *Monte Gibello*; a volcano or burning mountain of Sicily, situated in Long. 15. E. Lat. 38. N.

This mountain, famous from the remotest antiquity, both for its bulk and terrible eruptions, stands in the eastern part of the island, in a very extensive plain, called *Val di Demona*, from the notion of its being inhabited by devils, who torment the spirits of the damned in the bowels of this volcano.

Magnitude and height of the mountain.

The base of Ætna is well defined by the sea, and by the rivers Giaretta and Alcantara; and is about eighty-seven miles in circumference, with its greatest diameter extending from east to west. The following measurements, taken by Captain Smyth, we have adopted as the most accurate hitherto published:

The Summit	10874 feet.
Foot of the Cone	9760
The English House	9592
Philosopher's Tower	9467
Bishop's Snow Stoves	7410
Highest part of the Woody Region	6279
The Goats' Cavern	5362
Angelo the Herdsman's Cottage	4205
Nicolosi Convent	2449
Lingua-Grossa	1725
Caltabiano Station	371
Catania Station	47

General appearance.

The products and general appearance of this volcano have been described by many travellers. The journey from Catania to its summit has been described by M. D'Orville, Mr Brydone, Sir William Hamilton, M. Houel, the abbé Spallanzani, Smyth, &c. They all agree that this single mountain affords an epitome of the different climates throughout the whole world. Towards the foot it is extremely hot; farther up, more temperate; and grows gradually more and more cold the higher we ascend. At the very top it is perpetually covered with snow: from thence the whole island is supplied with that article, so necessary in a hot climate, and without which, the natives say, Sicily could not be inhabited. So great is the demand for this commodity, that the bishop's revenues, which are considerable, arise from the sale of Mount Ætna's snow; and he is said to draw L.1000 a year from one small portion lying on the north side of the mountain. Great quantities of snow and ice are likewise exported to Malta and Italy, making a considerable branch of commerce. The snow of Ætna, says Captain Smyth, is not only consumed in vast quantities all over the island, but forms an extensive article of commerce with Malta and Italy, to which places it is sent in such profusion as to be sold from a penny to threepence the pound, a rate which renders it accessible to the lower orders.

Crater described.

In the middle of the snowy region stands the great *crater*, or mouth of Ætna. Sir William Hamilton describes the crater as a little mountain, about a quarter of a mile perpendicular, and very steep, situated in the middle of a gently inclining plain, of about nine miles in circumference. It is entirely formed of stones and ashes; and, as he was informed by several people of Catania, had been thrown up about 25 or 30 years before the time (1769) he visited Mount Ætna. Before this mountain was thrown up, there was only a prodigiously large chasm or gulf in the middle of the above-mentioned plain; and it has been remarked, that about once in 100 years the top of Ætna falls in; which undoubtedly must be the case at certain periods, otherwise the mountain would continually increase in height. As this little mountain, though emitting smoke from every pore, appeared solid and firm, Sir William Hamilton and his companions went up to the very top. In the middle is a hollow, about two miles and a half in circumference, according to Sir William Hamilton; three miles and a half, according to Mr Brydone; and three or four, according to M. D'Orville. The inside is crusted over with salts and sulphur of different colours. It goes shelving down from the top, like an inverted cone; the depth, in Sir William Hamilton's opinion, nearly corresponding to the height of the little mountain. From many places of this space issue volumes of sulphurous smoke, which being much heavier than the circumambient air, instead of ascending in it, roll down the side of the mountain, till, coming to a more dense atmosphere, it shoots off horizontally, and forms a large track in the air, according to the direction of the wind; which, happily for our travellers, carried it exactly to the side opposite to that on which they stood. In the middle of this funnel is the tremendous and unfathomable gulf, so much celebrated in all ages, both as the terror of this life and the place of punishment in the next. From this gulf continually issue terrible and confused noises, which in eruptions are increased to such a degree as to be heard at a prodigious distance. Its diameter is probably very different at different times; for Sir William Hamilton observed, by the wind clearing away the smoke from time to time, that the inverted hollow cone was contracted almost to a point; while M. D'Orville and Mr Brydone found the opening very large. Both Mr Brydone and Sir William Hamilton found the crater too hot to descend into it; but M. D'Orville was bolder; and accordingly, he and his fellow-traveller, fastened to ropes which two or three men held at a distance for fear of accidents, descended as near as possible to the brink of the gulf; but the small flames and smoke which issued from it on every side, and a greenish sulphur, and pumice stones, quite black, which covered the margin, would not permit them to come so near as to have a full view. They only saw distinctly, in the middle, a mass of matter which rose in the shape of a cone, to the height of above 60 feet, and which towards the base, as far as their sight could reach, might be 600 or 800 feet. While they were observing this substance, some motion was perceived on the north side, opposite to that whereon they stood; and immediately the mountain began to send forth smoke and ashes. This eruption was preceded by a sensible increase of its internal roarings; which, however, did not continue, but, after a moment's dilatation, as if to give it vent, the volcano resumed its former tranquillity; but as it was by no means proper to make a long stay in such a place, our travellers immediately returned to their attendants.

View from the summit.

The top of Ætna being above the common region of vapours, the heavens appear with exceeding great splendour. Mr Brydone and his company observed, as they ascended in the night, that the number of stars seemed to be indefinitely increased, and the light of each of them appeared brighter than usual; the whiteness of the milky way was like a pure flame which shot across the heavens; and with the naked eye they could observe clusters of stars that were invisible from below. Had Jupiter been visible, he is of opinion that some of his satellites might have been discovered with the naked eye, or at least with a very small pocket-glass. He likewise took notice of several of those meteors called *falling stars*, which appeared as much elevated as when viewed from the plain; a proof, according to Mr Brydone, that "these bodies move in regions much beyond the bounds that some philosophers have assigned to our atmosphere."

To have a full and clear prospect from the summit of Mount Ætna, it is necessary to be there before sunrise, as the vapours raised by the sun in the daytime will obscure every object. Accordingly, our travellers took care to arrive there early enough; and all agree, that the beauty of the prospect from thence cannot be described. Here Mr Brydone and Sir William Hamilton had a view of Calabria in Italy, with the sea beyond it; the Lipari islands, and Stromboli, a volcano at about 70 miles distance, appeared just under their feet: the whole island of Sicily, with its rivers, towns, harbours, &c. appeared distinct, as if seen on a map. Massa, a Sicilian author, affirms, that the African coast, as well as that of Naples, with many of its islands, has been discovered from the top of Ætna. The visible horizon here is no less than 800 or 900 miles in diameter. The pyramidal shadow of the mountain reaches across the whole island, and far into the sea on the other side, forming a visible track in the air, which, as the sun rises above the horizon, is shortened, and at last confined to the neighbourhood of Ætna. The most beautiful part of the scene, however, in Mr Brydone's opinion, is the mountain itself, the island of Sicily, and the numerous islands lying round it. These last seem to be close to the skirts of Ætna, the distances appearing reduced to nothing.

M. Houel gives the following description of the view he enjoyed from the summit of the mountain. Here, being sheltered from the wind, and the day advancing, they began to enjoy the glorious prospect, which every moment became more extensive. At the rising of the sun, the horizon was serene, without a single cloud. "The coast of Calabria," says our author, "was as yet undistinguishable from the adjoining sea; but in a short time a fiery radiance began to appear from behind the Italian hills which bounded the eastern part of the prospect.

The fleecy clouds, which generally appear early in the morning, were tinged with purple; the atmosphere became strongly illuminated, and, reflecting the rays of the rising sun, appeared filled with a bright effulgence of flame. The immense elevation of the summit of Ætna made it catch the first rays of the sun's light, whose vast splendour, while it dazzled the eyes, diffused a most cherishing and enlivening heat, reviving the spirits, and diffusing a pleasant sensation throughout the soul. But though the heavens were thus enlightened, the sea still retained its dark azure, and the fields and forests did not yet reflect the rays of the sun. The gradual rising of this luminary, however, soon diffused his light over the hills which lie below the peak of Ætna. This last stood like an island in the midst of the ocean, with luminous points every moment multiplying around, and spreading over a wider extent with the greatest rapidity. It was as if the universe had been observed suddenly springing from the night of non-existence. The tall forests, the lofty hills, and extensive plains of Ætna, now presented themselves to view. Its base, the vast tracts of level ground which lie adjacent, the cities of Sicily, its parched shores, with the dashing waves and vast expanse of the ocean, gradually presented themselves; while some fleeting vapours, which moved swiftly before the wind, sometimes veiled part of this vast and magnificent prospect." In a short time every thing was displayed so distinctly that they could plainly recognise all those places with which they were before acquainted. On the south were seen the hills of Camerata and Trapani; on the north, the mounts Pelegrino and Thermini, with the celebrated Enna once crowned with the temples of Ceres and Proserpine. Among these mountains were seen a great many rivers running down, and appearing like as many lines of glittering silver winding through a variety of rich and fertile fields, washing the walls of 29 cities, while their banks were otherwise filled with villages, hamlets, &c. rising among the ruins of the most illustrious republics of antiquity. On the south and north were observed the rivers which bound by their course the vast base of Mount Ætna, and afford a delightful prospect to the eye; while at a much greater distance were seen the isles of Lipari, Alicudi, Felicocide, Parinacia, and Stromboli.

Regions. This mountain is divided into three parts or zones, which are distinguished by the names of the *Regione Culta*, the fertile or cultivated region; the *Regione Sylvosa*, the woody or temperate region; and the *Regione Deserta*, the frigid or desert zone or region. All these are plainly distinguished from the summit.

Regione Deserta. The desert region is a dreary waste of black lava, scoria, and ashes, in the centre of which, in a desolate plain, rises the cone, to the height of eleven hundred feet. Immediately under the cone is an edifice, erected at the expense of the British officers who during the late war were stationed in Sicily, containing rooms and stabling; a great convenience to those travellers who resort to it in the proper season, but during the greater part of the year a single snow storm is sufficient to overwhelm it. Not far from this house are the vestiges of a brick building, called the *Philosopher's Tower*, from the supposition of its having been the dwelling of Empedocles. M. Houel, however, says, "it seems not to be very ancient, neither the materials of which it consists, nor the mode of architecture, bearing any resemblance to those of the Greeks or Romans."

Regione Sylvosa. Immediately below the desert region is the woody region, which is an extensive forest of about six or seven miles in length, encircling the mountain, and affording pasturage to the numerous flocks and herds that are fed there. The woods are irregularly distributed, according to the ravages of the lava, and the senseless destruction of them by the natives. The neighbourhood of Maletto is richly clothed with fine oaks, pines, and poplars; above Nicolosi and Milo are produced stunted oaks, with fir, beech, cork, hawthorn, and bramble; and in the districts of Mascali and Piraino there are groves of cork, and luxuriant chesnut trees. The vicinity of Bronte abounds with pines of great magnitude; but the Carpinetto boasts that father of the forest, the venerable *Castagno di cento cavalli*, or chesnut of the hundred horses, supposed to be one of the oldest known trees, and, as far as is known, the largest tree in Europe. Some travellers describe it as a single tree; others, and with more plausibility, as produced by the inosculation of several young chesnut trees. It appears to consist of five large and two smaller trees. The largest trunk Captain Smyth found to measure 38 feet in circumference, and the circuit of the whole five, measured just above the ground, is 163 feet. It still bears rich foliage, and much small fruit, though the heart of the trunk is decayed, and a public road leads through them. Besides this, there is abundance of other trees in the neighbourhood, very remarkable for their size. One is mentioned as being upwards of 70 feet in circumference. Many parts of this region are remarkably picturesque, and even romantic; and its cool temperature is extremely grateful when contrasted with the heat of the lower region.

"These majestic forests of Ætna," says Houel, "afford a singular spectacle, and bear no resemblance to those of other countries. Their verdure is more lively, and the trees of which they consist are of a greater height. These advantages they owe to the soil whereon they grow; for the soil produced by volcanoes is particularly favourable to vegetation, and every species of plants grows here with great luxuriance. In several places, where we can view their interior parts, the most enchanting prospects are displayed. The hawthorn trees are of an immense size. Our author saw several of them of a regular form, and which he was almost tempted to take for large orange trees cut artificially into the figures they represented. The beeches appear like as many ramified pillars, and the tufted branches of the oak like close bushes impenetrable to the rays of the sun. The appearance of the woods in general is exceedingly picturesque, both by reason of the great number and variety of the trees, and the inequality of the ground, which makes them rise like the seats in an amphitheatre, one row above another; disposing them also in groups and glades, so that their appearance changes to the eye at every step; and this variety is augmented by accidental circumstances, as the situation of young trees among others venerable for their antiquity; the effects of storms, which have often overturned large trees, while stems shooting up from their roots, like the Lernæan hydra, show a number of heads newly sprung to make up that which was cut off."

Several extensive caverns occur in this region, among which, one is well known by the name of the *Goats' Cavern* or *Grotto*, because it is frequented by those animals, which take refuge there in bad weather. Formerly travellers on their ascent rested here, but since the erection of the more convenient shelter higher up the mountain, called the English House, it has been abandoned.

Regione Culta. The fertile district or region comprises the delightful country round the skirts of the mountain, and is very unequal in its dimensions, being in many parts from six to nine miles broad, and above Catania nearly eleven; while on the northern side, where the woods encroach, it is little more than half a mile broad. The whole is more or less covered with towns, villages, and monasteries, and is well peopled, notwithstanding the danger of such a situation. The soil is made up of decomposed lava and tuffa. It is easily worked and very productive, yielding the finest corn, oil, wine, fruit, and aromatic shrubs, in Sicily. The inhabitants, however, of many of these districts, as Smyth remarks, from the numerous minute particles of volcanic dust that fly about, severely injuring and disfiguring their eyes, and soiling their persons, their furniture, and their houses, have a squalid, slovenly, and dejected appearance. These circumstances, with the want of water, and the numerous and arid patches of lava amidst the surrounding vegetation, leave such a paradise little to be envied. In addition to these inconveniences, the constant danger of losing both landed and movable property by an eruption must be borne in mind; a disaster compared with which, earthquakes, hurricanes, plagues, and other visitations are light, as these may be counteracted in a few years, while the other destroys for ages. The terrible eruption of 1699 burst forth in this region.

In this region the river *Acis*, so much celebrated by the poets, in the fable of Acis and Galatea, takes its rise. It bursts out of the earth at once in a large stream, runs with great rapidity, and about a mile from the source throws itself into the sea.

Season for ascending the mountain.

The most desirable season, according to Smyth, for ascending the mountain, is during the full moons that occur between the middle of June and the first autumnal rains. The latter appear in the form of snow on the summit; and the peasants below attentively observe whether the east or west side is covered earliest, because in the former case they expect a wet season, and in the latter a dry one. After the equinox the weather again becomes settled, and the journey is practicable and easy until the middle of October. The ascent from Catania, through Nicolosi, to the English house, is effected on mules with the greatest ease, or even in a *Lettiga;* but from thence to the top of the cone the journey is very fatiguing. The obstacles are numerous: the surface, towards the summit, is frequently so hot as to make even resting inconvenient, and the materials, being only scoria, puzzolana, and triturated ashes, occasion the foot to sink and recede more or less at every step.

Geognostical structure.

This mighty mountain, which rises suddenly from the surrounding low country, is mostly composed of porphyritic lavas, which in every instance possess such characters as show that in all probability they have been ejected above the surface of the *waters*, and not under pressure. It rises out of a basaltic *crater of elevation*, hence its lower part is of a basaltic nature. The products of the eruptions of this mountain, in point of magnitude, form a striking contrast with those of Vesuvius; for even the greatest bodies of lava erupted from the Neapolitan mountain almost sink into insignificance when compared with those of Ætna, some of the streams or coulées of Ætna being four or five miles in breadth, 15 in length, and from 50 to 100 feet in thickness.

The elevation of Ætna, too, is so great that the lava frequently finds less resistance in piercing the flanks of the mountain than in rising to its summit; and has in this manner formed a number of minor cones, many of which possess their respective craters, and have given rise to considerable streams of lava. The most striking and original feature in the physiognomy of Ætna, says Dr Daubeny, is the zone of subordinate volcanic hills with which it is encompassed, and which look like a court of subaltern princes waiting upon their sovereign. Of these, some are covered with vegetation, others are bare and arid, their relative antiquity being probably denoted by the progress vegetation has made upon their surface; and the great difference which exists in this respect seems to indicate, that the mountain, to which they owe their origin, must have been in a state of activity, if not at a period antecedent to the commencement of the present order of things, at least at a distance of time exceedingly remote. It must be remarked, however, continues Daubeny, that the time which it takes to bring a volcanic mountain or stream of lava into cultivation is very variable;[1] and that the progress is generally more rapid in a cone composed of finely comminuted cinders, than in a stream of lava, which consists of a hard glossy substance, that yields but slowly to the causes of decomposition. There is nothing in the nature of lava, chemically considered, prejudicial to vegetation; but mechanically, the hard surface is inimical, as it gives no support to the tender shoots, and from its vesicularity often carries off all the moisture that falls on its surface. From these causes, the surface of a stream of lava must always require a long time to bring it into cultivation. This being the case, we naturally feel desirous of verifying an observation reported by Brydone, on the authority of the canon Recupero, which might render us doubtful as to the correctness of our received chronologies. This writer, says Dr Daubeny, after giving an instance of a lava, the date of which goes back to the time of the second Punic war, proceeds to state, that at Aci Reale we see seven such beds superimposed one on the other, each of which has its surface thoroughly decomposed and converted into rich vegetable mould. Now, if a single bed of lava has continued for more than 2000 years without experiencing any alteration, what a lapse of time must it have required to reduce seven successive beds of the same material into a state of such decomposition.

"Although I have no reason," says Dr Daubeny, "to doubt that Brydone received from Recupero the observation on which he grounds his inferences, I think it most probable that the conclusion itself was his own, though he perhaps thought it would sound more *piquant* if put into the mouth of the *Canon*, whose scientific knowledge he seems willing to exalt at the expense of his orthodoxy. In reality, however, this good priest appears to have enjoyed in both respects a reputation which he very little deserved. The reports of Dolomieu and other really scientific travellers make him out to have been a man of but slender philosophical attainments, but as one who at least was free from all imputation of scepticism. It is curious, nevertheless, that another foreigner has stated, as an instance of the intolerant spirit prevailing in the country in which he lived, that the poor Abbé was thrown into prison for his religious opinions, although the truth appears to have been, that the reports circulated in his favour by Brydone, Borch, and others, induced the Neapolitan government to grant him a pension on the score of his scientific deserts. Indeed, the only annoyance, it is said, he ever experienced in consequence of his imagined discovery, was the being informed that certain foreigners, to whom he communicated his observation, not content with wresting it to a purpose of which he had never dreamt, had given him credit for the inferences which they had chosen to deduce from it themselves.

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[1] "This will appear from the following statement of the condition of a few of the lavas of Vesuvius, which I examined with reference to this question in 1823:

Lava of 1551.—Fossa di Gaetano. Much decomposed; heaths grow upon it, and vines begin to be planted.
1737.—But little decomposed; moss alone grows on it.
1760.—Near the hill of the Camalduli. Still unfit for vegetation; surface, however, whitened and crumbly, owing to decomposition, which has proceeded farther than in that of 1737.
1771.—Colour grey; moss grows upon it, but no heath.
1785.—Fossa di Sventurato. Lava still quite hard and rough.
1794.—Fossa di Cucazzello. Surface much decomposed; moss grows upon it, and a few heaths, but no trees or shrubs. It is to be observed, that even the latter are met with on the surface of the crater from which this lava flowed, and which was formed by heaps of scoriæ ejected at the same time; a proof of what I have asserted in the text with respect to the more rapid decomposition of loose ashes than of a bed of lava.
1805.—Fossa del Noce. Colour very white; no moss appears to grow upon it; but, being covered with the loose scoriæ of later eruptions, it has trees growing upon it in a few parts.
1810.—Colour grey; surface rough, though somewhat decomposed; moss grows upon it, but no heaths or trees are seen, except in one part where it is covered with cinders.
1822.—Colour black; surface very rough and irregular; no moss as yet to be seen.

It will be seen that many of these lavas are in a more forward state than that of Ischia, which flowed in 1302, more than 200 years before." (Daubeny's *Volcanoes*, p. 204.)

"The fact, nevertheless, reported by Brydone, obtained a currency proportionate to the popularity which his work enjoyed; and the heterodox conclusion excited at the time no slight degree of consternation among divines. It was generally combated, by remarking the great variableness as to the period which a bed of lava will take to undergo decomposition; and even Spallanzani, though he visited Sicily, seems to have contented himself with pointing out instances in which newer beds of lava have taken the start of older ones in their progress towards cultivation.

"I was therefore not a little surprised, when, on visiting the celebrated spot of the Abbé's observation, I found that the beds of vegetable mould, which proved, according to Brydone, the degree to which the decomposition of the lava had extended, were in reality nothing more nor less than beds of a ferruginous tuffa, formed probably at the very period of the flowing of the lava, and originating perhaps from a shower of ashes that immediately succeeded its eruption. It is true that the cliff, which exhibits a section of these lava beds with interposed tuffa, shows also the greater facility with which the latter has yielded to the action of the elements, as the bare and mural precipices presented by the lava are in contrast with the gentler slope of the beds of tuffa, which afford a soil sufficient for the hardy cactus, and in some places even for the vine. Still there is not the slightest evidence that the decomposition exists internally, or that it had taken place in any one instance before the superincumbent bed of lava was deposited.

"Even had the tuffa in question been in reality *vegetable mould*, the validity of Mr Brydone's conclusion might very easily be disputed, for I think it cannot be shown that any one of the beds, of which the cliff of Aci Reale exposes a section, are of postdiluvial origin. So abrupt and lofty a face of rock would hardly have been cut by processes now in operation, but may be attributed with more probability to the cause which last reduced our continents to their existing form.

"If we examine, too, the characters of these beds, we shall find them sufficiently distinguished by their greater compactness and stony aspect from modern lavas; whilst the general correspondence in mineralogical characters that exists between them all, affords a strong presumption of their having been produced about the same period.

"But it is useless to multiply proofs of the fallacy of Mr Brydone's statement; and the only circumstance that needs surprise us is, that thirty years should have elapsed without any traveller having visited the spot with the view of ascertaining the correctness of the observation.

"Should the high antiquity I have assigned to this volcano be questioned, I may remark, that there are valleys on the slope of the mountain which appeared to me too considerable to be the result of torrents, and that among the diluvial matter at its foot, I have found rolled masses of cellular as well as compact lava; the presence of the former seeming to prove that the volcano was in activity at some period intermediate between the general retreat of the ocean and the event which formed the valleys, and reduced the fragments of rock detached to the rounded condition in which we observe them." (Daubeny's *Volcanoes*, p. 206.)

We shall close this article with an enumeration of all the different eruptions from Mount Ætna which are found upon record.

List of eruptions.

1. The first is that of which Diodorus Siculus speaks, but without fixing the period at which it happened. That eruption, says he, obliged the Sicani, who then inhabited Sicily, to forsake the eastern and retire to the southern part of the island. A long time after that, the Sicilians, a people of Italy, migrated into Sicily, and took up their abode in that part of the island which had been left desert by the Sicani.

2. The second eruption known to have issued from this volcano is the first of the three mentioned by Thucydides; of none of which he fixes the date, mentioning only in general, that from the arrival of the first Greek colonies that settled in Sicily (which was in the 11th Olympiad, and corresponds to the 734th year before the Christian era), to the 88th Olympiad, or the year 425 before Christ, Ætna at three different times discharged torrents of fire. This second eruption happened, according to Eusebius, in the days of Phalaris, in the 565th year before the Christian era. The assertion of Eusebius is confirmed by a letter from that tyrant to the citizens of Catania, and by the answer of the Catanians (if, after Bentley's Dissertations against their authenticity, any credit be due to the Epistles of Phalaris). But Diodorus gives both these pieces.

3. The third, which is the second of the three mentioned by Thucydides, happened in the 65th Olympiad, in the 477th year before the Christian era, when Xantippus was archon at Athens. It was in this year that the Athenians gained their boasted victory over Xerxes's general Mardonius near Platæa. Both the eruption of the volcano and the victory of the Athenians are commemorated in an ancient inscription on a marble table, which still remains. An ancient medal exhibits a representation of an astonishing deed to which that eruption gave occasion. Two heroic youths boldly ventured into the midst of the flames to save their parents: their names, which well deserve to be transmitted to future ages, were Amphinomus and Anapius. The citizens of Catania rewarded so noble a deed with a temple and divine honours. Seneca, Silius Italicus, Valerius Maximus, and other ancient authors, mention the heroism of the youths with just applause.

4. The fourth eruption, the third and last of those mentioned by Thucydides, broke out in the 88th Olympiad, in the 425th year before the Christian era. It laid waste the territory of Catania.

5. The fifth is mentioned by Julius Obsequens and Orosius, who date it in the consulship of Sergius Fulvius Flaccus and Quintus Calpurnius Piso, nearly 133 years before the Christian era. It was considerable; but no peculiar facts are related concerning it.

6. In the consulship of Lucius Æmilius Lepidus and Lucius Aurelius Orestes, in the 125th year before the Christian era, Sicily suffered by a violent earthquake. Such a deluge of fire streamed from Ætna as to render the adjoining sea, into which it poured, absolutely hot. Orosius says, that a prodigious quantity of fishes were destroyed by it. Julius Obsequens relates, that the inhabitants of the Isles of Lipari ate such a number of those fishes as to suffer, in consequence of it, by a distemper which proved very generally mortal.

7. Four years after the last mentioned, the city of Catania was desolated by another eruption, not less violent. Orosius relates, that the roofs of the houses were broken down by the burning ashes which fell upon them. It was so dreadfully ravaged, that the Romans found it necessary to grant the inhabitants an exemption from all taxes for the space of ten years, to enable them to repair it.

8. A short time before the death of Cæsar, in the 43d year before Jesus Christ, there was an eruption from Mount Ætna. Livy mentions it. Rhegium suffered during this eruption. It was afterwards considered as an omen of the death of Cæsar.

9. Suetonius, in the life of Caligula, mentions an eruption from Mount Ætna which happened in the 40th year after the Christian era. The emperor fled on the very night on which it happened, from Messina, where he at that time happened to be.

10. Carrera relates, that in the year 253 there was an eruption from Mount Ætna.

11. He speaks of another in the year 420, which is also mentioned by Photius.

12. In the reign of Charlemagne, in the year 812, there was an eruption from Ætna. Charlemagne, who witnessed it, was much alarmed.

13. In the year 1169, on the 4th February, about daybreak, there was an earthquake in Sicily, which was felt as far as Reggio, on the opposite side of the strait. Catania was reduced by it to ruins; and in that city more than 15,000 souls perished. The bishop, with 44 monks of the order of St Benedict, was buried under the ruins of the roof of the church of St Agatha. Many castles in the territories of Catania and Syracuse were overturned; new rivers burst forth, and ancient rivers disappeared. The ridge of the mountain was observed to sink in on the side next Taormino. The spring of Arethusa, so famous for the purity and sweetness of its waters, then became muddy and brackish. The fountain of Ajo, which rises from the village of Saraceni, ceased to flow for two hours, at the end of which the water gushed out more copiously than before. Its waters assumed a blood colour, and retained it for about an hour. At Messina, the sea, without any considerable agitation, retired a good way beyond its ordinary limits; but soon after returning, it rose beyond them, advanced to the walls of the city, and entered the streets through the gates. A number of people who had fled to the shore for safety were swallowed up by the waves. Ludovico Aurelio relates, that the vines, corn, and trees of all sorts were burnt up, and the fields covered over with such a quantity of stones as rendered them unfit for cultivation. At this time a great part of Syria was wasted by an earthquake.

14. Twelve years after this, in the year 1181, a dreadful eruption issued from Ætna, on the east side. Streams of fire ran down the declivity of the mountain, and encircled the church of St Stephen, but without burning it.

Nicholas Speciale, who relates, though he did not see, this event, was witness to another conflagration on Ætna 48 years after this, in the year 1329, on the 23d of June, of which he has given a description.

15. On that day, says he, about the hour of vespers, Ætna was strongly convulsed, and uttered dreadful noises: not only the inhabitants of the mountain, but all Sicily, were struck with consternation and alarm. On a sudden, a terrible blaze of fire issued from the southern summit, and spread over the rocks of Mazzara, which are always covered with snow. Together with the fire, there appeared a great deal of smoke. After sunset, the flames, and the stones that issued out with them, were seen to touch the clouds. The fire making way for itself with the most furious impetuosity, burnt up or reduced to ruins all those structures which the piety of former times had consecrated to the Deity. The earth yawning, swallowed up a great many springs and rivulets. Many of the rocks on the shore of Mascali were shaken and dashed into the sea. A succession of these calamities continued till the 15th of July, when the bowels of Ætna were again heard to rebellow. The conflagration of Mazzara still went on unextinguished. The earth opened near the church of St John, called *Il Paparinecca*; on the south side fire issued from the gap with great violence. To add to the horrors of the day, the sun was obscured from morning to evening with clouds of smoke and ashes, as entirely as in an eclipse. Nicholas Speciale went towards the new opened crater, to observe the fire and the burning stones which were issuing from the volcano. The earth rebellowed and tottered under his feet; and he saw red-hot stones issue four times successively in a very short space from the crater with a thundering noise, the like of which, he says, he had never before heard.

In a few days after this, all the adjacent fields were burnt up by a shower of fire and sulphurous ashes; and both birds and quadrupeds, being thus left destitute of food, died in great numbers. A great quantity of fishes likewise died in the rivers and the contiguous parts of the sea. "I cannot think," says he, "that either Babylon or Sodom was destroyed with such awful severity."—The north winds, which blew at the time, carried the ashes as far as Malta. Many persons of both sexes died of terror.

16. Scarcely had four years elapsed after this terrible event, when Ætna made a new explosion, and discharged volleys of stones, causing the neighbouring fields to tremble. This happened in the year 1333.

17. Forty-eight years after this, on the 25th of August 1381, an eruption from Ætna spread its ravages over the confines of the territory of Catania, and burnt up the olive yards in the neighbourhood of that city.

18. In the year 1444, 63 years after the last eruption, a torrent of lava issued from Ætna, and ran towards Catania. The mountain shook; and the shocks were so violent, that several huge masses of rock were broken from its summit, and hurled into the abyss with a tremendous noise.

19. After this Ætna was scarcely at rest for 18 months or two years. On Sunday the 25th of September 1446, about an hour after sunset, an eruption issued from the place called *La Pietra di Mazzara*. This eruption was soon over.

20. In the following year, 1447, on the 21st of September, there was another, with a good deal of fire; but this eruption was likewise of short duration.

21. Ætna now ceased to emit fire, and that for a considerable time. The neighbouring inhabitants not only ascended to the summit of the mountain, but even, if we may credit accounts, went down into the fiery gulf, and believed the volcanic matter to be now exhausted. But on the 25th of April 1536, near a century from the slight eruption in 1447, a strong wind arose from the west, and a thick cloud, reddish in the middle, appeared over the

summit of the mountain. At the very same instant a large body of fire issued from the abyss, and fell, with the noise and rapidity of a torrent, along the eastern side of the mountain, breaking down the rocks, and destroying the flocks and every other animal that was exposed to its fury. From the same crater, on the summit of the mountain, there issued at the same time a stream of fire more terrible than the other, and held its course towards the west. It ran over Bronte, Adrans, and Castelli. It consisted entirely of sulphur and bitumen. On the same day the church of St Leon, which stood in a wood, was first demolished by the shocks of the earthquake, and its ruins after that were consumed by the fire. Many chasms were opened in the sides of the mountain; and from these issued fire and burning stones, which darted up into the air with a noise like that produced by a smart discharge of artillery. Francis Negro de Piazza, a celebrated physician, who lived at Lentini, wishing to have a nearer view of the eruptions, and to make some observations which he thought might be of consequence, was carried off and burnt to ashes by a volley of the burning stones. This conflagration of Ætna lasted some weeks.

22. In less than a year, on the 17th of April 1537, the river Simeto swelled so amazingly as to overflow the adjacent plains, and carry off the country people, and their cattle and other animals. At the same time, the country around Paterno, the neighbouring castles, and more than 500 houses, were destroyed by the ravages of the river; and most of the wood was torn up by the roots by violent blasts of wind. These ravages of the elements were followed by Ætna, which on the 11th of the following month was rent in several places, disclosing fiery gulfs, and pouring out a deluge of fire in more terrible torrents than those of the preceding year. They directed their course towards the monastery of St Nicholas d'Arena; destroyed the gardens and vineyards; and proceeding onwards towards Nicolosi, burnt Montpellieri and Fallica, and destroyed the vineyards and most of the inhabitants. When the conflagration ceased, the summit of the mountain sunk inward with such a noise, that all the people in the island believed the last day arrived, and prepared for their end by extreme unction. These dreadful disturbances continued throughout the whole year, more especially in the months of July and August, during which all Sicily was in mourning. The smoke, the noise, and the shocks of the earthquake, affected the whole island; and if Filotes may be believed, who relates this event, many of the Sicilians were struck deaf by the noise. Many structures were demolished; and among others the castle of Corleone, though more than 25 leagues distant from the volcano.

23. During the succeeding 30 years there was no disturbance of this nature. At the end of that space, Sicily was alarmed by a new eruption from the mountain. Ætna discharged new streams of fire, and covered the adjacent country with volcanic ashes, which entirely ruined the hopes of the husbandman.

24. In the year 1579 Ætna renewed its ravages; but no particular account of the damage which it did upon this occasion has been transmitted to us.

25. Twenty-five years had elapsed, when Ætna, in the month of June 1603, flamed with new fury. Peter Carrera affirms that it continued to emit flames for the space of 33 years, till 1636, without interruption, but not always with the same violence. In 1607 the streams of lava which flowed from it destroyed the woods and vineyards on the west side of the mountain. In 1609 they turned their course towards Aderno, and destroyed a part of the forest Del Pino, and a part of the wood called *La Sciambrita*, with many vineyards in the district Costerna. These torrents of lava continued to flow for three months. In the year 1614 a new effort of the subterraneous fire opened another crater, from which fire was discharged on Randazzo, in the district called *Il Piro*. The fire continued to flame for 10 or 12 years longer.

26. The same Peter Carrera relates, that a dreadful conflagration happened in the year 1664, of which he himself was witness. It happened on the 19th of December, and lasted without interruption, but with different degrees of violence, till the end of May 1678. But in 1669 the inhabitants of Nicolosi were obliged to forsake their houses, which tumbled down soon after they left them. The crater on the summit of Ætna had not at this time a threatening aspect, and every thing there continued quiet till the 25th of March: but on the 8th of that month, an hour before night, the air was observed to become dark over the village La Pedara and all that neighbourhood; and the inhabitants of that country thought that an almost total eclipse was taking place. Soon after sunset, frequent shocks of earthquakes began to be felt: these were at first weak, but continued till day-break to become more and more terrible. Nicolosi was more affected than any other tract of country on that side of Ætna. About noon every house was thrown to the ground; and the inhabitants fled in consternation, invoking the protection of heaven. On the 10th of March a chasm several miles in length, and five or six feet wide, opened in the side of the mountain; from which, about two hours before day, there arose a bright light, and a very strong sulphurous exhalation was diffused through the atmosphere.

About 11 in the forenoon of the same day, after dreadful shocks of earthquake, a crater was opened in the hill called *Des Noisettes*, from which there issued huge volumes of smoke, not accompanied with fire, ashes, or stones, but with loud and frequent claps of thunder, displaying all the different phenomena with which thunder is at different times attended. And what was very remarkable, the chasm was formed on the south side, between the top and the bottom of the mountain. On the same day another chasm was formed two miles lower, from which issued a great deal of smoke, accompanied with a dreadful noise and earthquake. Towards the evening of the same day, four other chasms were opened towards the south, in the same direction, accompanied during their formation with the same phenomena, and extending all the way to the hill called *La Pusara*.

About twelve paces beyond that, another of the same kind was formed. On the succeeding night, a black smoke, involving a quantity of stones, issued from this last chasm: it discharged at the same time flakes of a dark-coloured spongy matter, which became hard after they fell. There issued from the same gulf a stream of lava, which held its course into a lake called *La Hardia*, six miles from Montpellieri, and on its way thither destroyed many dwelling-houses and other buildings in the neighbouring villages.

On the next day, March 12th, this stream of fire directed its course towards the tract of country called *Malpasso*, which is inhabited by 800 people: in the space of 20 hours it was entirely depopulated and laid waste. The lava then took a new direction, in which it destroyed some other villages.

The mount of Montpellieri was next destroyed, with all the inhabitants upon it.

On the 23d of the same month, the stream of fire was in some places two miles broad. It now attacked the large village of Mazzalucia; and on the same day a vast gulf was formed, from which were discharged sand or ashes, which produced a hill with two summits, two miles in circumference, and 150 paces high. It was observed to consist of yellow, white, black, grey, red, and green stones.

The new mount of Nicolosi continued to emit ashes for the space of three months; and the quantity discharged was so great as to cover all the adjoining tract of country for the space of 15 miles. Some of these ashes were conveyed by the winds as far as Messina and Calabria; and a north wind arising, covered all the southern country about Agosta, Lentini, and even beyond that, in the same manner.

While at that height on Nicolosi so many extraordinary appearances were passing, the highest crater on the summit of Ætna still preserved its usual tranquillity.

On the 25th of March, about one in the morning, the whole mountain, even to the most elevated peak, was agitated by a most violent earthquake. The highest crater of Ætna, which was one of the loftiest parts of the mountain, then sunk into the volcanic focus; and in the place which it had occupied, there now appeared nothing but a wide gulf more than a mile in extent, from which there issued enormous masses of smoke, ashes, and stones. At that period, according to the historian of this event, the famous block of lava on Mount Frumento was discharged from the volcanic focus.

In a short time after, the torrent of fire, which still continued to flow, directed its course towards Catania with redoubled noise, and accompanied with a much greater quantity of ashes and burning stones than before. For several months many most alarming shocks of earthquakes were felt, and the city was threatened with destruction by the torrent of fire. In vain they attempted to turn or divert its course: the lava rose over the walls, and entered by an angle near the Benedictine convent on the 11th of June following. This awful event is related by Francis Monaco, Charles Mancius, Vincent Auria, and Thomas Thedeschi.

A description of the lava issuing from Mount Ætna in 1669 was sent to the court of England by Lord Winchelsea, who at that time happened to be at Catania on his way home from an embassy to Constantinople. Sir W. Hamilton gives the following extract from it. "When it was night, I went upon two towers in divers places; and I could plainly see, at ten miles distance, as we judged, the fire begin to run from the mountain in a direct line, the flame to ascend as high and as big as one of the greatest steeples in your Majesty's kingdoms, and to throw up great stones into the air. I could discern the river of fire to descend the mountain, of a terrible fiery or red colour, and stones of a paler red to swim thereon, and to be some as big as an ordinary table. We could see this fire to move in several other places, and all the country covered with fire, ascending with great flames in many places, smoking like a violent furnace of iron melted, making a noise with the great pieces that fell, especially those that fell into the sea. A cavalier of Malta, who lives there, and attended me, told me, that the river was as liquid, where it issues out of the mountain, as water, and comes out like a torrent with great violence, and is five or six fathom deep, and as broad, and that no stones sink therein."

The account given in the Philosophical Transactions is to the same purpose. We are there told, that the lava is "nothing else than divers kinds of metals and minerals, rendered liquid by the fierceness of the fire in the bowels of the earth, boiling up and gushing forth as the water doth at the head of some great river; and having run in a full body for a stone's cast or more, began to crust or curdle, becoming, when cold, those hard porous stones which the people call *sciarri*. These, though cold in comparison of what first issues from the mountain, yet retained so much heat as to resemble huge cakes of sea-coal strongly ignited, and came tumbling over one another, bearing down or burning whatever was in their way. In this manner the lava proceeded slowly on till it came to the sea, when a most extraordinary conflict ensued betwixt the two adverse elements. The noise was vastly more dreadful than the loudest thunder, being heard through the whole country to an immense distance; the water seemed to retire and diminish before the lava, while clouds of vapour darkened the sun. The whole fish on the coast were destroyed, the colour of the sea itself was changed, and the transparency of its waters lost for many months."

While this lava was issuing in such prodigious quantity, the merchants, whose account is recorded in the Philosophical Transactions, attempted to go up to the mouth itself, but durst not come nearer than a furlong, lest they should have been overwhelmed by a vast pillar of ashes, which to their apprehension exceeded twice the bigness of St Paul's steeple in London, and went up into the air to a far greater height. At the mouth itself was a continual noise, like the beating of great waves of the sea against rocks, or like distant thunder, which was sometimes so violent as to be heard 60, or even 100 miles off; to which distance also part of the ashes was carried. Some time after, having gone up, they found the mouth from whence this terrible deluge issued to be only a hole about 10 feet diameter. This is also confirmed by Mr Brydone; and is probably the same through which Sir William Hamilton descended into the subterranean caverns already mentioned.

27. Some years after this conflagration, a new burning gulf opened, in the month of December 1682, on the summit of the mountain, and spread its lava over the hill of Mazzara.

28. On the 24th of May 1686, about ten in the evening, a new eruption burst out from the summit of the mountain, on the side contiguous to the hill Del Bue. Such a quantity of inflamed matter was thrown out as consumed woods, vineyards, and crops of grain, for four leagues round. It stopped its course in a large valley near the castle of Mascali. Several people from the neighbourhood had ascended a hill between the wood of Catania and the confines of Cirrita, to observe the progress of the lava; but the hill on a sudden sunk inwards, and they were buried alive.

29. Ætna was now long quiet; for no less a space of time indeed than one half of the present age. In the year 1755 its eruptions were renewed. During these eruptions, there issued from the mountain a great torrent of boiling-hot salt water.

Eruption of water in 1755.

This water took its course down the west side of the mountain; and the channel which it cut for itself is still visible. The eruption of water from burning mountains is still much less frequent than that of lava or half-vitrified solid matters, ashes, &c. though that of water, and even mixed with the shells of marine animals (though we are not told whether it was salt or not), has sometimes been observed in other volcanoes, particularly Vesuvius. The eruption we now speak of happened in the month of February 1755. It was preceded by an exceedingly thick black smoke issuing from the crater, intermixed with flashes of fire. This smoke gradually became thicker, and the bursts of flame more frequent. Earthquakes and subterraneous thunder convulsed the mountain, and struck the inhabitants of the adjacent parts with the utmost terror. On Sunday the 2d of March, the mountain was seen to emit a huge column of smoke, exceedingly dense and black, with a dreadful noise in the bowels of the earth, accompanied also with violent flashes of lightning. From time to time there were loud cracks, like the explosions of cannon; the mountain appeared to shake from its foundations; the air on that side next Mascali became very dark, and loud peals of thunder were heard. These seemed to issue from two caverns, considerably below the summit, on the side of the mountain, and were accompanied with violent blasts of wind like a tempest.

These terrible phenomena continued and increased. Ætna seemed ready to swallow up at once all those materials which it had been for so many years disgorging, or rather about to sink at once into the bowels of the earth, from whence it appeared to have been elevated. The prospect was far beyond any idea that can be given by description of this tremendous scene. The inhabitants were alarmed beyond measure; the sight of the flames driven by the winds against the sides of the mountain, the shocks of the earthquake, and the fall of rocks, struck the imagination with a horror not to be conceived. During this dreadful commotion, an immense torrent of water was emitted from the highest crater of the mountain. The whole summit of Ætna was at that time covered with a thick coating of snow. Through this the boiling water directed its course eastward, and in its passage met with frightful precipices. Over these it dashed with the utmost violence, adding its tremendous roaring to the complicated horrors of this awful scene. The snow, melting instantaneously as the boiling torrent advanced, increased its destructive power by augmenting its quantity; while the mischievous effects of the heat were scarcely diminished, by reason of the immense quantity of boiling liquid which continued to pour from the summit of the mountain.

This boiling torrent having dashed its awful cataracts from one chain of rocks to another, at length reached the cultivated plains, which it overflowed for a number of miles. Here it divided itself into several branches, forming as many deep and rapid rivers, which, after several other subdivisions, discharged themselves into the sea.

Though the mountain continued to discharge water in this manner only for half an hour, the ravages of it were very terrible. Not only those of common inundations, such as tearing up trees, hurrying along rocks and large stones, took place here, but the still more dreadful effects of boiling water were felt. Every cultivated spot was laid waste, and every thing touched by it was destroyed. Even those who were placed beyond the reach of the torrent, beheld with inexpressible horror the destruction occasioned by it; and though the alarming noises which had so long issued from the mountain now ceased in a great measure, the shocks of earthquakes, and the violent smoke which continued to issue from the mountain, showed that the danger was not over. Two new openings were now observed, and two torrents of lava began to make their way through the snow.

On the 7th of March a dreadful noise was again heard in the bowels of the mountain, and a new column of very thick and black smoke began to issue from it. A horrid explosion of small stones succeeded, some of which were carried as far as the hills of Masculi, and great quantities of black sand to Messina, and even quite over the strait to Reggio in Calabria. On the shifting of the wind to the northward this sand reached as far as the plains of Agosta. Two days after, the mountain opened again, and a new torrent of lava was discharged; which, however, advanced very slowly towards the plain, moving only at the rate of a mile in a day. It continued to flow in this manner for six days, when every thing appeared so quiet that the canon Recupero set out to view the changes which had taken place.

Course of the current traced by Recupero.

That gentleman's design was to trace the course of the dreadful torrent of water above mentioned. This he was very easily enabled to do by the ravages it had made; and, by following the channel it had cut all the way from the sea to the summit of the volcano, he found that this immense quantity of water had issued from the very bowels of the mountain. After issuing from the crater, and increasing its stream by passing through and melting the snow which lay immediately below the summit, it destroyed in an instant a fine and extensive forest of fir-trees. All of these were torn up by the violence of the current, though many were no less than from 24 to 30 inches in diameter. He observed that the great stream had in its descent divided itself into four branches; and these had again subdivided themselves into several smaller ones, easily distinguishable by the quantity of sand they had deposited. Afterwards re-uniting their streams, they formed many islands, and rivers 900 feet in breadth, and of a depth which could not easily be determined. Proceeding farther down, and still forcing its way among the beds of old lava, the channel of the waters was widened to 1500 feet, until it was again contracted in the valleys as before. Every object which stood in the way of this tremendous torrent was moved from its place. Enormous rocks were not only hurried down, but several of them moved to more elevated situations than those they formerly occupied. Whole hills of lava had been removed and broken to pieces, and their fragments scattered along the course of the river; and the valleys were filled up by vast quantities of sand which the waters had deposited. Our author observed, that even at the time he visited the mountain, about ten years after the eruption, the whole side of it still bore the marks of this deluge.

30. In the year 1763 there was an eruption, which continued three months, but with intervals. Ætna was at first heard to rebellow. Flames and clouds of smoke were seen to issue out, sometimes silver-coloured, and at other times, when the rays of the sun fell upon them, of a purple radiance. At length they were carried off by the winds, and rained, as they were driven before them, a shower of fire all the way to Catania and beyond it. An eruption soon burst out: the principal torrent divided into two branches, one of which ran towards the east, and fell into a deep and extensive valley.

The flames which issued from this new crater afforded a noble spectacle. A pyramid of fire was seen to rise to a prodigious height in the air, like a beautiful artificial firework, with a constant and formidable battery, which shook the earth under those who were spectators of the scene. Torrents of melted matter, running down the sides of the mountain, diffused a light bright as day through the darkness of night.

At sunrising the burning lava was observed to have run round some oaks that were still standing unburnt. Their leaves were all withered. Some birds had fallen from their branches, and been burnt to death. Some people cast wood upon the lava, and it was immediately burnt. This lava continued hot, and exhaled smoke, for two years. For five years after this, no snow appeared on the summit of Ætna.

31. In the year 1764 a new crater was opened at a great distance from Mount Ætna.

32. In the year 1766 another was opened at the grotto of Paterno: fire, smoke, and an inconsiderable torrent of lava, issued out of it.

33. On the 27th of January 1780 a new opening was formed two miles under the last-mentioned crater. On the 28th of February and the 14th of March the earthquake was renewed on the north side, and accompanied with terrible noises.

Between the 6th of April and the 7th of May the convulsions were renewed, accompanied with noise as before. A quantity of pumice stones and fine sand was discharged from it.

On the 18th of May the shocks were renewed. On the 23d a new crater was formed on the side of Mount Frumento on the summit of Ætna, and from it a torrent of lava discharged, which spread through the valley of Laudunza. It was 200 paces in breadth. Two other chinks were opened in the mountain near Paterno, and very near one another. The lava issuing from them proceeded, in the space of seven days, six miles; on the 25th it had run nine miles.

A new crater was likewise opened on the 25th, from which a quantity of red-hot stones continued to issue for half an hour, and fell at a very great distance. There proceeded likewise from it a stream of lava, which in the same space of time ran over a tract of country two miles in extent.

Several parts of those streams of lava were observed to be cold on the surface, and formed into solid masses, but melted again by a new stream of burning lava, which, however, did not melt the old lava.

Account of the eruption in 1787.

34. In 1787 there was a great eruption. From the 1st to the 10th of July there were signs of its approach. On the 11th, after a little calm, there was a subterraneous noise, like the sound of a drum in a close place, and it was followed by a copious burst of black smoke. It was then calm till the 15th, when the same prognostics recurred. On the 17th the subterraneous noise was heard again: the smoke was more abundant, slight shocks of an earthquake followed, and the lava flowed from behind one of the two little mountains which form the double head of Ætna. On the 18th, while the spectators were in anxious expectation of a more severe eruption, all was quiet, and continued so for more than 12 hours. Soon after they perceived some new shocks, accompanied with much noise; and the mountain threw out a thick smoke, which, as the wind was westerly, soon darkened the eastern horizon. Two hours afterwards a shower of fine black brilliant sand descended: on the east side it was a storm of stones, and at the foot of the mountain a deluge of flashes of fire, of scoria and lava.

These appearances continued the whole day. At the setting of the sun the scene changed: a number of conical flames rose from the volcano; one on the north, another on the south, were very conspicuous, and rose and fell alternately. At three in the morning, the mountain appeared cleft, and the summit seemed a burning mass. The cones of light which arose from the crater were of an immense extent, particularly the two just mentioned. The two heads seemed to be cut away; and at their separation was a cone of flame, seemingly composed of many lesser cones. The flame seemed of the height of the mountain placed on the mountain, so that it was probably two miles high, on a base of a mile and a half in diameter. This cone was still covered with a very thick smoke, in which there appeared very brilliant flashes of lightning, a phenomenon which Ætna had not before afforded. At times, sounds like those from the explosion of a large cannon were heard, seemingly at a less distance than the mountain. From the cone, as from a fountain, a jet of many flaming volcanic matters was thrown, which were carried to the distance of six or seven miles. From the base of the cone a thick smoke arose at the time when the rivers of lava broke out, which for a moment obscured some parts of the flame. This beautiful appearance continued three quarters of an hour. It began the next night with more force, but continued only half an hour. In the intervals, however, Ætna continued to throw out flames, smoke, ignited stones, and showers of sand. From the 20th to the 22d, the appearances gradually ceased. The stream of lava was carried towards Bronte and the plain of Lago.

After the eruption, the top of the mountain on the western side was found covered with hardened lava, scoria, and stones. The travellers were annoyed by smoke, by showers of sand, mephitic vapours, and excessive heat. They saw that the lava which came from the western point divided into two branches, one of which was directed towards Libeccio, the other, as we have already said, towards the plain of Lago. The lava on the western head of the mountain had, from its various shapes, been evidently in a state of fusion; from one of the spiracula, the odour was strongly that of liver of sulphur. The thermometer, in descending, was at 40 degrees of Fahrenheit's scale; while near the lava, in the plain of Lago, it was 140 degrees. The lava extended two miles; its width was from 13¾ to 21 feet, and its depth 13¾ feet.

35. Eruptions in 1792. Eruptions of greater and less magnitude from May until the close of the year.

36. A small eruption in June 1798.

37. Smaller eruption in June 1799.

38. Eruption of lava and flood of water in February 1800.

39. Eruption in 1802.

40. Eruption in March 1809.

41. Eruption in October 1811.

42. Eruption in May 1819. (o.)

ÆTOLARCHA, in *Grecian Antiquity*, the principal magistrate or governor of the Ætolians.

ÆTOLIA, a country of ancient Greece, comprehending all that tract now called the *Despotat*, or *Little Greece*. It was parted on the east by the river Evanus, now the Fidari, from the Locrenses Ozolæ; on the west, from Acarnania, by the Achelous; on the north, it bordered on the country of the Dorians and part of Epirus; and on the south extended to the Bay of Corinth.

The Ætolians were a restless and turbulent people, seldom at peace among themselves, and ever at war with their neighbours; utter strangers to all sense of friendship or principles of honour; ready to betray their friends upon the least prospect of reaping any advantage from their treachery: in short, they were looked upon by the other states of Greece no otherwise than as outlaws and public robbers. On the other hand, they were bold and enterprising in war; inured to labour and hardships; undaunted in the greatest dangers; jealous defenders of their liberties, for which they were on all occasions willing to venture their lives, and sacrifice all that was most dear to them. They distinguished themselves above all the other nations of Greece in opposing the ambitious designs of the Macedonian princes, who, after having reduced most of the other states, were forced to grant them a peace upon very honourable terms. The constitution of the Ætolian republic was copied from that of the Achæans, and with a view to form, as it were, a counter-alliance; for the Ætolians bore an irreconcilable hatred to the Achæans, and had conceived no small jealousy at the growing power of that state. The Cleomenic war, and that of the allies, called the *social war*, were kindled by the Ætolians in the heart of Peloponnesus, with no other view than to humble their antagonists the Achæans. In the latter they held out, with the assistance only of the Eleans and Lacedemonians, for the space of three years, against the united forces of Achaia and Macedon; but were obliged at last to purchase a peace, by yielding up to Philip all Acarnania. As they parted with this province much against their will, they watched all opportunities of wresting it again out of the Macedonian's hand; for which reason they entered into an alliance with Rome against him, and proved of great service to the Romans in their war with him; but growing insolent on account of their services, they made war upon the Romans themselves. By that warlike nation they were overcome, and granted a peace on the following severe terms:—1. The majesty of the Roman people shall be revered in all Ætolia. 2. Ætolia shall not suffer the armies of such as are at war with Rome to pass through her territories, and the enemies of Rome shall be likewise the enemies of Ætolia. 3. She shall, in the space of 100 days, put into the hands of the magistrates of Corcyra all the prisoners and deserters she has, whether of the Romans or their allies, except such as have been taken twice, or during her alliance with Rome. 4. The Ætolians shall pay down in ready money, to the Roman general in Ætolia, 200 Euboic talents, of the same value as the Athenian talents, and engage to pay 50 talents more within the six years following. 5. They shall put into the hands of the consul 40 such hostages as he shall choose, none of whom shall be under 12, or above 40 years of age: the pretor, the general of the horse, and such as have been already hostages at Rome, are excepted out of this number. 6. Ætolia shall renounce all pretensions to the cities and territories which the Romans have conquered, though these cities and territories had formerly belonged to the Ætolians. 7. The city of Oenis and its district shall be subject to the Acarnanians.

After the conquest of Macedon by Æmilius Paulus, they were reduced to a much worse condition; for not only those among them who had openly declared for Perseus, but such as were only suspected to have favoured him in their hearts, were sent to Rome, in order to clear themselves before the senate. There they were detained, and never afterwards suffered to return into their native country. Five hundred and fifty of the chief men of the nation were barbarously assassinated by the partisans of Rome, for no other crime than that of being suspected to wish well to Perseus. The Ætolians appeared before Æmilius Paulus in mourning habits, and made loud complaints of such inhuman treatment, but could obtain no redress; nay, ten commissioners, who had been sent by the senate to settle the affairs of Greece, enacted a decree, declaring that those who were killed had suffered justly, since it appeared to them that they had favoured the Macedonian party. From this time those only were raised to the chief honours and employments in the Ætolian republic who were known to prefer the interest of Rome to that of their country; and as these alone were countenanced at Rome, all the magistrates of Ætolia were the creatures and mere tools of the Roman senate. In this state of servile subjection they continued till the destruction of Corinth and the dissolution of the Achæan league, when Ætolia, with the other free states of Greece, was reduced to a Roman province, commonly called the *province of Achaia*. Nevertheless, each state and city was governed by its own laws, under the superintendency of the pretor whom Rome sent annually into Achaia. The whole nation paid a certain tribute, and the rich were forbidden to possess lands anywhere but in their own country.

In this state, with little alteration, Ætolia continued under the emperors till the reign of Constantine the Great, who, in his new partition of the provinces of the empire, divided the western parts of Greece from the rest, calling them *New Epirus*, and subjecting the whole country to the *præfectus prætorii* for Illyricum. Under the successors of Constantine Greece was parcelled out into several principalities, especially after the taking of Constantinople by the western princes. At that time Theodorus Angelus, a noble Grecian of the imperial family, seized on Ætolia and Epirus. The former he left to Michael his son, who maintained it against Michael Palæologus, the first emperor of the Greeks, after the expulsion of the Latins. Charles, the last prince of this family, dying in 1430 without lawful issue, bequeathed Ætolia to his brother's son, named also *Charles*; and Acarnania to his natural sons Memnon, Turnus, and Hercules. But great disputes arising about this division, Amurath II., after the reduction of Thessalonica, laid hold of so favourable an opportunity, and drove them all out in 1432. The Mahometans were afterwards dispossessed of this country by the famous prince of Epirus, George Castriot, commonly called *Scanderbeg*, who with a small army opposed the whole power of the Ottoman empire, and defeated these barbarians in 22 pitched battles. That hero at his death left great part of Ætolia to the Venetians; but they not being able to make head against such a mighty power, the whole country was soon reduced by Mohammed II. whose successors hold it to this day.

AFER, Domitius, a famous orator, born at Nismes, flourished under Tiberius, and the three succeeding emperors. Quintilian makes frequent mention of him, and commends his pleadings. But he disgraced his talents, by turning informer against some of the most distinguished personages in Rome. Quintilian, in his youth, cultivated the friendship of Domitius very assiduously. He tells us that his pleadings abounded with pleasant stories, and that there were public collections of his witty sayings, some of which he quotes. He also mentions two books of his *On Witnesses*. Domitius was once in great danger from an inscription he put upon a statue erected by him in honour of Caligula, wherein he declared that this prince was a second time consul at the age of 27. This he intended as an encomium, but Caligula taking it as a sarcasm upon his youth and his infringement of the laws, raised a process against him, and pleaded himself in person. Domitius, instead of making a defence, repeated part of the emperor's speech with the highest marks of admiration; after which he fell upon his knees, and begging pardon, declared that he dreaded more the eloquence of Caligula than his imperial power. This piece of flattery succeeded so well, that the emperor not only pardoned, but also raised him to the consulship. Afer died in the reign of Nero, A. D. 59.

AFFA, a weight used on the Gold Coast of Guinea, equal to an ounce: the half of it is called *eggeba*. Most of the blacks on the Gold Coast give these names to these weights.

AFFECTION, in a general sense, implies an attribute inseparable from its subject. Thus magnitude, figure, weight, &c. are affections of all bodies; and love, fear, hatred, &c. are affections of the mind.

Affection is a term used by various writers on *Moral Philosophy* to denote all those active principles whose direct and ultimate object is the communication either of enjoyment or of suffering to any one of our fellow-creatures. (Stewart's *Philosophy of the Active Powers*, vol. i. p. 75.)

Affection, among physicians, is the same as disease. Thus, hysteric *affection* is the same as hysteric disease.

AFFERERS, or Afferors, in *Law*, persons appointed in courts-leet, courts-baron, &c. to settle, upon oath, the fines to be imposed upon those who have been guilty of faults arbitrarily punishable.

AFFETTUOSO, or *Con Affetto*, in the Italian music, intimates that the part to which it is added ought to be played in a tender, moving way, and consequently rather slow than fast.

AFFIANCE, in *Law*, denotes the mutual plighting of troth between a man and woman to marry each other.

AFFIDAVIT signifies an oath in writing, sworn before some person who is authorized to take the same.

AFFINITY, among civilians, implies a relation contracted by marriage, in contradistinction to consanguinity, or relation by blood. Affinity does not found any real kinship; it is no more than a kind of fiction, introduced on account of the close relation between husband and wife. It is even said to cease when the cause of it ceases: hence a woman who is not capable of being a witness for her husband's brother during his lifetime, is allowed for a witness when a widow, by reason the affinity is dissolved. Yet with regard to the contracting of marriage, affinity is not dissolved by death, though it be in every thing else.—There are several degrees of affinity, wherein marriage was prohibited by the law of Moses: thus, the son could not marry his mother, or his father's wife (Lev. xviii. 7. *et seq.*); the brother could not marry his sister, whether she were so by the father only or by the mother only, and much less if she was his sister both by the same father and mother; the grandfather could not marry his grand-daughter, either by his son or daughter. No one could marry the daughter of his father's wife, nor the sister of his father or mother; nor the uncle his niece; nor the aunt her nephew; nor the nephew the wife of his uncle by the father's side. The father-in-law could not marry his daughter-in-law; nor the brother the wife of his brother while living, nor even after the death of his brother if he left children. If he left no children, the surviving brother was to raise up children to his deceased brother, by marrying his widow. It was forbidden to marry the mother and the daughter at one time, or the daughter of the mother's son, or the daughter of her daughter, or two sisters together.

Affinity is also used to denote conformity or agreement. Thus we say, the *affinity* of languages, the *affinity* of words, the *affinity* of sounds, &c.

Affinity, in *Chemistry*, a term employed to express that peculiar propensity which the particles of matter have to unite and combine with each other exclusively, or in preference to any other connection.—The attractions between bodies at insensible distances, and which of course are confined to the particles of matter, have been distinguished by the name of *affinity;* while the term *attraction* has been more commonly confined to cases of sensible distance.

AFFIRMATION, in *Logic*, the asserting of the truth of any proposition.

Affirmation, in *Law*, denotes an indulgence allowed to the people called *Quakers*, who, in cases where an oath is required from others, may make a solemn affirmation that what they say is true; and if they make a false affirmation, they are subject to the penalties of perjury. But this relates only to oaths taken to the government, and on civil occasions; for Quakers are not permitted to give their testimony in any criminal case, &c.

Affirmation is also used for the ratifying or confirming of the sentence or decree of some inferior court. Thus we say, the house of lords affirmed the decree of the chancellor, or the decree of the lords of session.

AFFIRMATIVE, in *Grammar*. Authors distinguish affirmative particles, such as *yes*. The term *affirmative* is sometimes also used substantively. Thus we say, the affirmative is the more probable side of the question: there were so many votes, or voices, for the affirmative.

AFFIX, in *Grammar*, a particle added at the close of a word, either to diversify its form or alter its signification. We meet with *affixes* in the Saxon, the German, and other northern languages, but more especially in the Hebrew, and other oriental tongues. The Hebrew *affixes* are single syllables, frequently single letters, subjoined to nouns and verbs, and contribute not a little to the brevity of that language. The oriental languages are much the same as to the *radicals*, and differ chiefly from each other as to *affixes* and *prefixes*.

AFFLATUS literally denotes a blast of wind, breath, or vapour, striking with force against another body. The word is Latin, formed from *ad*, to, and *flare*, to blow. Naturalists sometimes speak of the afflatus of serpents. Tully uses the word figuratively, for a divine inspiration; in which sense he ascribes all great and eminent accomplishments to a divine afflatus. The Pythian priestess being placed on a tripod or perforated stool, over a holy cave, received the divine afflatus, as a late author expresses it, in her belly; and being thus inspired, fell into agitations, like a phrenetic; during which she pronounced, in hollow groans and broken sentences, the will of the Deity. This afflatus is supposed by some to have been a subterraneous fume or exhalation, wherewith the priestess was literally inspired. Accordingly, it had the effects of a real physical disease, the paroxysm of which was so vehement, that, Plutarch observes, it sometimes proved mortal. Van Dale supposes the pretended enthusiasm of the Pythia to have arisen from the fumes of aromatics.

AFFORESTING, Afforestatio, the turning of ground into forest. The Conqueror and his successors continued afforesting the lands of the subject for many reigns, till the grievance became so notorious, that the people of all degrees and denominations were brought to sue for relief; which was at length obtained, and commissions were granted to survey and perambulate the forest, and separate all the new-afforested lands, and reconvert them to the uses of their proprietors, under the name and quality of *purlieu* or *pouralle land*.

AFFRAY, or Affrayment, in *Law*, formerly signified the crime of affrighting other persons, by appearing in unusual armour, brandishing a weapon, &c.; but at present *affray* denotes a skirmish or fight between two or more.

AFFRONTEE, in *Heraldry*, an appellation given to animals facing one another on an escutcheon; a kind of bearing which is otherwise called *confrontée*, and stands opposed to *adossée*.

AFFUSION, the act of pouring some fluid substance on another body. Dr Grew gives several experiments of the luctation arising from the affusion of divers menstruums on all sorts of bodies. Divines and church historians speak of baptism by affusion, which amounts to much the same with what we now call *sprinkling*.

AFGHANISTAN,

An extensive and powerful kingdom of Asia, which formed at one time a considerable portion of the Mogul empire. On the decline of that power, it rose to the rank of an independent state; and from its population and extent, and still more from the character of the people, who are brave, hardy, and enterprising, as well as from its commanding position in the heart of Asia, it soon acquired political importance, and has since acted a principal part in all the revolutions which have occurred either in Hindostan or in Persia.

It is only of late years that Europeans have obtained any authentic account of this interesting country. In

1793, Mr Foster, in the course of an overland journey from India, in which he was exposed to the greatest danger from the predatory habits and religious prejudices of the people, succeeded in penetrating into those mountainous regions. He visited the cities of Cashmere, Cabul, and Candahar, respecting which his information is equally curious and instructive. But the most complete and satisfactory account of Afghanistan is derived from the work of Mr Elphinstone, by whom it was visited in 1808. It was supposed that about this time the French were meditating an invasion of British India; and Afghanistan being in a manner one of the outworks of Hindostan through which an invading army must make its approaches on the north, it was judged necessary to apprize the sovereign of his danger, in order to secure his co-operation against the common enemy. With this view a mission was sent to him by the British government, at the head of which was Mr Elphinstone, who, along with the other members of the embassy, determined, with a laudable and enlightened zeal, to profit by so favourable an opportunity for collecting information respecting the geography and productions of the country, the manners of the people, and their condition, character, and habits; on all which subjects they have accordingly furnished the most satisfactory and ample details. From the valuable materials furnished by those travellers, the following account has been chiefly composed.

Boundaries.

It is extremely difficult to fix the boundaries of this country, which frequently extend into wild mountainous tracts, or into deserts, where no definite line of demarcation is to be found, either political or natural. Its boundaries are also apt to fluctuate, from the constant warfare of the frontier tribes, who own but a very imperfect allegiance to their monarch, whoever he may be, and who by their lawless inroads continually encroach on his dominions. Afghanistan, in the era of its greatest prosperity, extended to 16 degrees of longitude from Sirhind, about 150 miles from Delhi to Meshed, and about the same distance from the Caspian Sea. In breadth it extended from the Oxus to the Persian Gulf, a space of 910 miles. But its territories have been greatly reduced by war; and the authority of the sovereign, even in many of those countries which are included within his dominions, is but feebly acknowledged. In defining the irregular limits of this diminished kingdom, we may premise, that from the east of Bengal, in long. 90°, to Herat, in long. 62°, a vast chain of mountains, which tower above the level of perpetual snow, extends under the names of the Himalaya, Hindoo Coosh, and Paropamisus. The country of the Afghans is bounded on the north by this great mountain wall, which from Cashmere, the eastern limit of Afghanistan, takes a south-west direction as far as the snowy peak of Hindoo Coosh, nearly north of Cabul, from which the whole range derives its name. From this peak the same chain, with a lower declination, extends westward, under the name of the Paropamisan Mountains, 350 miles to Herat, and thus completes the northern boundary of Afghanistan. On the east the Indus is the boundary so long as the river continues near the hills, which is as far as lat. 32. 20. The plain on the western bank of the river to the south of this is inhabited, not by the Afghans, but by the Beloches, an independent tribe, and intervenes between the Afghan territory and the river. The Soliman Mountains, therefore, which are a branch from the Hindoo Coosh, running south-south-east along the course of the Indus, with their subordinate ranges, and the plain immediately at their base, are included in the country of the Afghans, and form here its eastern boundary. In lat. 29° north, where the Soliman Mountains terminate, this plain extends westward, and has new boundaries. On the north it has hills which stretch east and west at right angles to the Soliman range; and those hills form the southern boundary of Afghanistan, separating it from the low and hot plain of Cutch Gundawa or Seweestan on the south. The southern frontier of the Afghan country is extremely irregular. Before reaching the table-land of Kelat, in long. 66° E., it recedes towards the north, and extends west as far as the desert, which separates it on the north-west from Persia. The Afghans have no general name for their country but that of Afghanistan, which, Mr Elphinstone thinks, was probably first employed in Persia. It is frequently used in books, and is not unknown to the inhabitants. It is sometimes known under the appellation of the kingdom of Cabul.

Aspect of the country, mountains, and rivers.

Afghanistan to the west of the Soliman Mountains, which form an eastern barrier, may be described generally as a table-land, lying higher than most of the neighbouring countries. The Hindoo Coosh Mountains, its northern bulwark, overlook the low country of Balk, the ancient Bactria, formerly a province of Persia, and inhabited by the Usbeck Tartars. On the east it is equally elevated above the lower plains of the Indus. On the south it overlooks Seweestan; and on the south-west a deep valley runs between it and Belochistan. It slopes gradually to the west, and loses the appearance of elevation as it approaches the Paropamisan Mountains. The mountainous chain of Hindoo Coosh is a continuation of the great Himalaya ridge, which it rivals in grandeur and elevation. From the elevated plains of Afghanistan these mountains are seen on the north in four distinct ranges. The first and lowest had no snow in February, when it was observed by Mr Elphinstone from the plain of Peshawer; but the tops of the second still had their winter covering, and the third had snow half-way down. The fourth and highest range is covered with snow at all seasons. It is of great elevation, some of its peaks rising, according to measurement, to the height of 20,493 feet, and is conspicuous from Bactria, from the borders of India, and from places in Tartary at the amazing distance of 250 miles. "The stupendous heights of these mountains," says Elphinstone, "the magnificence and variety of their lofty summits, the various nations by whom they are seen, and who seem to be brought together by this common object, and the awful and undisturbed solitude which reigns amid their eternal snows, fill the mind with an admiration and astonishment which no language can express." The inferior ranges of the Hindoo Coosh Mountains decrease in height according to their distance from the principal chain. The title of table-land, which has been applied to Afghanistan, if it is understood to imply any thing more than that it is raised above the level of the surrounding regions, will convey a very inaccurate idea of the nature of the country, which, so far from being a plain, is of the most diversified surface, being intersected everywhere with chains of mountains, which diverge in various directions from the main ridge of Hindoo Coosh. We will not enter into any detailed description of this complicated mass of mountains, which, however accurate, would fail to present any very clear view of the topography of the country. It may be generally stated, that the ridges branch off southward, not exactly at right angles from the main ridge, but in irregular lines, to the distance of 60 or 70 miles, when they decline to a lower level; and that those ridges are separated by intervening valleys, each of which is watered by a river flowing down the southern declivity of the Hindoo Coosh Mountains into the Cabul, which, after an easterly course along the base of the mountains of about 350 miles, joins the great Indus. These valleys or glens all open from the south into the great valley of Cabul; and the country is described as being fertile, and of a pleasing appearance. On the lower hills by which the valleys are closed in, the snow generally lies for four months in the year; there are few trees on the tops, but their sides are covered with forests of pine, oak, and wild olive. Lower down, the country improves, and is interspersed with many little valleys, watered by clear and beautiful streams, and enjoying a delicious climate, under which European fruits and flowers grow wild in the utmost variety and perfection; and even the rocks add to the beauty of the scenery, from the rich verdure of mosses with which they are covered. The narrow and alluvial plain at the bottom, through which the river runs, is in general highly productive. The valley of the river Swaut, which may be taken as a sample of all the others, yields two harvests, and produces most sorts of grain; and on the plains are numerous mulberry trees and planes, besides other fruit-trees improved by culture.

Westward from the Indus about 150 miles, an immense curve or angle projects southward from the mountain barrier of the country into the interior to the distance of 70 miles, when the snowy mountain abruptly descends into the low and hot plain of Jellalabad. The range then resumes its westerly course, when lower hills assume their former appearance and character, and form the Cohistan or high lands of Cabul, a country watered by the river of this name and its tributary streams, and described as fruitful and of a delightful aspect. The Paropamisan chain bounds this country on the west, and forms a maze of mountains, of which the most intimate knowledge would scarcely be able to trace the plan. They afford a habitation to some wandering and predatory tribes. This general description applies to that portion of the country from east to west which extends southward about 100 or 150 miles from the Hindoo Coosh Mountains. Beyond this the aspect of the country is varied by the range of the Soliman Mountains, which, commencing with Suffaid Coh, or the White Mountain, so called from the snow with which it is covered at all seasons, extend south-south-west almost parallel to the course of the Indus. These mountains decline towards the west by lower ridges, which run nearly in the same direction as the main ridge; while other ridges branch off eastward toward the Indus. The height of these mountains is greatly inferior to that of the Hindoo Coosh; but it is still great, as they are covered with snow to the end of spring, which, in the latitude of 31 degrees, gives a considerable altitude. Beyond the Soliman ridges on the west, the country consists for the most part of high and bleak downs, interspersed with moderate hills; in some places desert and ill cultivated, bare and open, better fitted for pasturage than for the plough, and inhabited by migratory tribes of shepherds. There are exceptions, however, to this general description. In the country which is watered by the Helmund and its tributary streams are found many fertile and delightful spots, which afford pleasant retreats to the shepherds, and pasturage to their flocks. The country round Candahar is fertile and highly cultivated; but to the south, and especially as it recedes west from the Helmund, it is a complete desert.

Afghanistan has few large rivers for a country of such extent, and so interspersed with mountains. With the exception of the Indus, there is not one which is not fordable throughout its course for the greater part of the year. They partake generally of the character of mountain torrents, swelling rapidly, and running off; or they are sometimes all drained away for the irrigation of the fields. The Indus, the eastern boundary of the country, from its volume of water, and the length of its course, which has been traced 1350 miles from its mouth, and which has its source much higher, may be reckoned one of the greatest rivers in the world. Of the rivers of Afghanistan it alone is navigable, though little use is made of it for this purpose. All the rivers of this country which take their rise in the Hindoo Coosh Mountains are tributary to this great stream. The Cabul is the drain of all the waters which fall on the southern declivity of the Hindoo Coosh Mountains. The most important river which it receives is the Kaushkhaur, which has its rise beyond the Hindoo Coosh range, in the same snowy peak which contains the sources of the Oxus. It rushes with surprising violence into the valley of the Cabul river, which it joins about 100 miles west of the Indus. Lower down, the Indus is joined by the Koorum from the west. The only river south of this which runs into the Indus is the Gomul, which, however, unless when it is swollen by the rains, never reaches its destination, being generally consumed in the irrigation of the country. The greatest of the rivers which run through the rest of Afghanistan is the Helmund or Etymander. This river is the drain of that extensive slope which lies between the Soliman and the Paropamisan Mountains. It has its rise in the latter, and running a south-west course of 400 miles, terminates in the Lake Seestan. The Urghundaub rises 88 miles north-east of Candahar, and after passing within a few miles of that city, joins the Helmund. It is never more than 150 yards broad. The Kashrood, which is a larger river, joins the Helmund after a course of 150 miles. The Furrahrood is a still larger stream; it has a course of 200 miles, and it is uncertain whether it reaches the Lake of Seestan, or is lost in the sands. The Turnuk is a tributary of the Urghundaub, which it joins about 75 miles west of Candahar. It is a rapid torrent, and receives the Urghessaun and other smaller rivers. Notwithstanding these additions, its stream rather decreases, being consumed in the irrigation of the country, or in the parched and barren sands through which it passes. The Lora, which rises in the south of Afghanistan, has a western course from the Soliman Mountains of 200 miles, where it disappears before it reaches the Helmund.

Climate.

The climate of Afghanistan is extremely various, owing to the height and inequality of its surface. According to its latitude, which is between the 29th and 35th degrees, it should have a decidedly hot temperature; but the general law of climate is here modified by the elevation of the ground, and great diversities of heat and cold are accordingly experienced within a very limited space. The mountainous nature of the country also occasions peculiarities in its climate, and distinguishes it in some degree from that of the adjacent regions. In almost all the countries of Asia within the same latitude as Afghanistan, one important circumstance in their climate is the season and quantity of the periodical rains. Throughout the greater part of India the rainy season is ushered in by the south-west monsoon, which drives the rolling clouds from the ocean on the land, where they descend in rains. The monsoon is earlier in the south of India, and in the vicinity of the ocean, than in the north, and the rains are heavier. In many cases the opposition of mountains in the interior either arrests entirely the progress of the clouds, or it varies their direction; and hence large tracts of country are exempted from, or only partially experience, the influence of the monsoons. Before they make their way from the Indian Ocean to Afghanistan, these periodical tempests are greatly moderated, having to traverse the whole extent of Bengal in their progress to the Himalaya Mountains, when they are forced by this impassable barrier out of their original course towards the south-east, and afterwards towards the east by the range of Hindoo Coosh; and it is from that quarter that such parts of Afghanistan as are exposed to the monsoon receive the periodical rains. But the clouds are exhausted as they pass on westward to this country, the rains gradually become less heavy, and are at last merely sufficient to water the mountains, without much affecting the plains below. In the north-eastern districts of Afghanistan, near the Indus, the countries under the range of Hindoo Coosh have their share of the rains; but 50 miles west, in the valley of Swaut, the season of the monsoon is merely a month of clouds, with occasional rains; and in the plain of Peshawer, which is other 50 or 60 miles farther west, and in some of the valleys to the south, it appears only in some clouds and showers: it is still less felt in the valley of the Cabul river. But the passing clouds being opposed by the southern projection of the Hindoo Coosh Mountains and the Soliman range, collect over some of the plains below, which are accordingly plentifully deluged with the periodical rains. In the country of Damaun, eastward of the Soliman Mountains, along the Indus, the monsoon prevails; as also generally in the southern parts of the country. But it varies greatly in different countries, being merely in some parts a month of clouds with showers. Its influence is less felt towards the north. Besides the partial influence of the south-west monsoons to which the eastern and southern provinces of Afghanistan are exposed, it has the winter and the spring rains, which are of great consequence to agriculture in all those countries between the Indus and the Hellespont which are not subjected to the full effect of the south-west monsoon.

The temperature of Afghanistan varies of course with the difference of level, and also from local causes. It is affected by the direction of the prevailing winds, some blowing over snowy mountains, others being heated in summer and rendered cold in winter by their passage over deserts and arid tracts of great extent. The heat of summer is refreshed in some places by the breezes from moister countries, and others are so environed with hills as to be sheltered from all winds. Thus, throughout this extensive country, great diversity of temperature takes place often within very short distances. In the Hindoo Coosh Mountains perpetual winter reigns, and among the lower ranges snow frequently lies for four months in the year. In the plain of Peshawer, which is within view of these snowy summits, the thermometer in summer rises as high as in the hottest parts of India. It is mentioned by Mr Elphinstone, that in a tent artificially cooled, the thermometer stood for several days of summer at 112° and 113° in the shade. But the heat is not so uniform, nor does it last so long, as that of an Indian summer. At intervals in June and July cold north-west winds set in, which refresh the air, and render it pleasant. The last half of September is so cold as to be counted among the winter months, and the cold continues to increase till February. But the winter is not severe; and though there is frost in the night, it is always dispelled during the day by the influence of the sun. The temperature of the different valleys depending in this manner on their respective levels, they frequently exhibit the most remarkable contrasts of heat and cold. The plain of Jellalabad during summer is intolerably hot, while to the south, and immediately above it, the mountain of Suffaid Coh lifts its snowy summit to the clouds. To the north the nearest hills are cold; and in the distance the Hindoo Coosh Mountains are seen skirting the horizon with a bright outline of perpetual snow, while the table-land of Cabul, immediately to the west, enjoys the coolness and verdure of a temperate summer. Among the Soliman Mountains, the higher countries are exposed to severe cold; but there are some of the lower valleys where the heat is even greater than at Peshawer. The low plains of Damaun, which run along the shores of the Indus, are oppressed during summer by scorching heats both night and day. On the western plains heat predominates, and they are accordingly deserted in the summer by the wandering shepherds, for the cool retreat and grassy valleys of the mountains. At Candahar the heat of summer is excessive, and is occasionally aggravated by the simoom winds. In proceeding north-east, however, along the course of the Helmund and its tributary streams, we reach elevated ground, where the cold is excessive, and where winter is experienced in all its severity. If we ascend the course of the Turnuk to Ghuzni, we find the snow lying deep for some time after the equinox, and so thick a covering of ice on the rivers as to afford a passage for camels. At Cabul the winter is more steady and severe than in England, while the summer heat is greater. The great difference between the seasons, and the quickness with which they change, are marked by the changes which take place in the dress of the inhabitants. In winter they wear woollen garments, and in some places clothes of felt, and over these a large great-coat of well-tanned sheep-skin with the long shaggy wool inside. With the vernal equinox the snow disappears, the country is covered with young grass, the buds burst forth, and are soon followed by a profusion of flowers; and the inhabitants change their winter dress for a thin one of chints or cotton, and frequently sleep at night under trees in the open air. The prevailing winds throughout Afghanistan are from the west, and they are generally cold; while the easterly wind is hot, and brings clouds. On the whole, the climate of this extensive country seems little subject to rains, clouds, or fogs; and judging from the size and strength of the inhabitants, it must be considered salubrious. Some fatal diseases are, however, common; such as fevers and agues, which prevail in autumn and in spring; also colds, which are sometimes dangerous in winter; and the small-pox, which still carries off many persons, though the practice of inoculation has long been introduced in all parts; and lastly, the ophthalmia.

Animals.

Afghanistan abounds in wild animals, which find ample range in the extensive forests and large tracts of unfrequented deserts which it contains. The lion, however, though so common in Persia, and though it has been lately found in such numbers in Guzerat, and in the Hurriana, north-west of Delhi, is rare. In the hilly country around Cabul there is a small animal which bears the name without any of the qualities of the lion. In the districts east of the Soliman range tigers and leopards are common, and they are to be found in most of the woody tracts of the country. Wolves, hyenas, jackals, foxes, hares, porcupines, and hedgehogs, are to be seen everywhere. The wolves are formidable during the winter in the cold parts, where they assemble in troops, destroying cattle, and frequently attacking men. The hyenas sometimes attack a bullock singly, and, as well as the wolves, they make great havock among the sheep. Bears of two kinds, the one the black bear of India, and the other of a dirty white, are quite common in all the woody mountains; but they rarely leave their haunts, except when they are tempted by the sugar-cane. There are also mangooses, ferrets, and wild dogs. Monkies are common in the north-eastern parts. The wild boars of Persia and India are seldom seen; and the wild ass is confined to the south-western districts, on the lower Helmund, and to the sandy country round Candahar. The mountains abound with many kinds of deer, including the elk; but the antelopes are rare, and confined to the plains. A species of deer is seen, which is remarkable for the size of its horns, and the strong but not disagreeable smell of its body. The king is in possession of a few elephants; but neither that animal nor the rhinoceros is to be found in any part of the country.

Among the domestic animals is the horse, a considerable number of which is bred in the Afghan dominions; and those bred near Herat are very fine, uniting the figure of the Arab horse with superior size. In general, however, the breed of Afghan horses is not good. There is a very strong and useful breed of ponies. On the other hand, the mules and asses are the most wretched that can be conceived. The camel is the animal most employed in carrying burdens. The dromedary, the tall long-legged animal common in India, is found all over the plains. The Bactrian camel, with two distinct humps, which is lower than the other by one-third, but stout, and covered with shaggy black hair, is much more rare, and is brought from the country beyond the Jaxartes. Buffaloes are to be found in many parts; and oxen are universally employed in the plough, and sometimes camels. They are not reared in the country, but are imported from the Rajpoot States, where they are the best in India. The sheep forms the principal stock of the pastoral tribes: it is remarkable for a tail about a foot in breadth, and consisting almost entirely of fat; in other respects it resembles the English sheep. The goat abounds in all the mountains, and is not scarce in the plains. Some of the breeds have remarkably long and curiously twisted horns. The pastoral tribes in the country, who are extremely fond of hunting, breed great numbers of excellent greyhounds, and even pointers, resembling those in England both in shape and quality. There is a breed of long-haired cats in great esteem, and of which great numbers are exported.

Of the birds, there are three sorts of eagles, and many kinds of hawks; namely, the gentle falcon, a large grey short-winged bird; the gos-hawk; the shauheen, which soars over the falconer's head, and strikes the quarry as it rises; and the chirk, which is trained to strike the antelope, and, by fastening on its head, to retard its flight till the greyhounds come up. The other birds are, herons, cranes, storks, wild ducks, geese, swans, partridges, quails, and a bird known in Europe under the name of the Greek partridge. There is another smaller bird resembling it, which is found nowhere except in Afghanistan. Pigeons, doves, crows, and sparrows, are common in all countries. Cuckoos, which are rare, and magpies, which are unknown in India, abound in the colder climate of those northern mountains; while peacocks, so commonly found wild in India, are here seen only in their domesticated state. Parrots make their appearance in the eastern provinces near the Indus.

The country is not infested with venomous reptiles. The snakes are mostly harmless; and though in Peshawer the scorpions are noted for their size and venom, their bite is scarcely ever fatal. There are no crocodiles, but there are turtles, as well as tortoises. In Khorassan, great flights of locusts have sometimes occasioned famine by their devastations, though this rarely occurs. Musquittoes are less troublesome than in India, except in the southern district of Seestan, where they sting as severely as in Bengal.

Vegetable products.

In most parts of Afghanistan there are two harvests, one in spring and the other in autumn. In the countries west of the Soliman range the former is the most important; but in the eastern parts the autumn harvest is the most considerable. The produce of the first, which is sown in spring and reaped in autumn, is wheat, barley, peas, beans, and other grains; that of the second, sown in the end of spring and reaped in autumn, is rice, Indian corn, and various kinds of pulse. Cotton is confined to the hot climates, and sugar is cultivated in some of the rich plains. Tobacco is produced in most parts. There is another distinct harvest, which is counted of great importance, of musk-melons, water-melons, the scented melon, and various sorts of cucumbers, pumpkins, and gourds, which are grown in the open fields. All common garden-stuffs are abundant, such as carrots, turnips, beetroot, lettuce, onions, garlic, spinnage, greens of all kinds, cabbages, cauliflowers, and many of the Indian vegetables. The castor oil plant is found everywhere. Madder abounds over all the western provinces, and the assafœtida plant in the hills. In the west, lucerne and a sort of trefoil are among the most important products of husbandry. Of the fruits and trees which abound in tropical countries, few are to be found east of the Soliman range, and none to the west; but almost all the European trees and fruits are indigenous in the congenial climate of those elevated regions. They are frequently found growing wild in different parts of the country, and are still more common in gardens and orchards. The most common trees in the mountains are pines, oaks, cedars, a sort of gigantic cypress, the walnut and the wild olive tree, the birch, the holley, and the hazel. In Hindoo Coosh the pistachio tree grows wild; and on the plains are the mulberry, the tamarisk, and the willow; also the plane and the poplar. English flowers, such as roses, jessamines, poppies, narcissuses, and hyacinths, are found in the gardens, and often in a wild state.

Minerals.

Of the minerals produced in the country little is known. Gold is said to be washed down the streams that flow from the Hindoo Coosh Mountains. Small quantities of silver are found in Caffristan; also lead, iron, and antimony, in different parts; sulphur and rock-salt in the salt range of mountains, and saltpetre everywhere.

Government.

The political institutions of the Afghans present the rude and disjointed materials of a free constitution. The form of the government is patriarchal. The nation is supposed to derive its origin from four tribes, which are divided and subdivided into inferior clans, until the last subdivision does not include more than a few families. The chief of a tribe is called Khan, and is elected in general by the king; while the head of one of the inferior divisions owes his choice to the people. To the khan, among the aristocratic tribes, is committed the collection of the royal revenue and the raising of the militia; and from the exercise of these duties, and the emoluments of his office, he derives extensive power and influence, more especially where he presides over a numerous tribe. Each inferior division of the tribe has its respective head; and in cases of emergency these all meet together and form a general assembly, called a Jeerga, which, with the khan presiding over it, deliberates and decides in all matters of public importance. The heads of the inferior branches of the tribe hold similar assemblies, which decide on minor matters, and are guided by the same rules as the greater convention. When wars arise among the different tribes, it is the business of the assemblies to provide the means of carrying them on, to concert the plan of operations, or to settle the terms of peace. They have the power, along with the khan, to call out all the fighting men of the tribe, or they may levy taxes for any purpose of public utility. There is scarcely a petty community throughout the nation which does not make its own arrangements for the support of moollahs, an order of Mahometan priests, and for the maintenance and reception of strangers into the tribe, whom it is always reckoned a duty to treat with peculiar attention.

The Afghan nation consists in this manner of numerous rude democracies, which are formed into one state by the supreme authority of the sovereign. He is the natural head of the tribe of Dooraunee, the greatest, bravest, and most civilized in the nation. He has, besides, a general superintendence over the whole kingdom, and may levy troops or money from each tribe for the common defence. But his authority is not equally respected by all the tribes. In the plains around the towns, throughout a considerable portion of the country, and in all the foreign provinces, he rules with full power, and collects a revenue and maintains an army without the aid of the khans or the popular assemblies. He employs for this purpose officers of his own appointment, namely, a haukim, who collects the revenue and commands the militia; a sirdar, who commands the regular troops, and whose duty it is to enforce submission to the haukim, and to the cauzy, who presides over the administration of justice. The heads of tribes, and under them the heads of the divisions of tribes, act in the revenue and police departments, under the haukim and the sirdar. Where the royal authority is strong, the khans have comparatively little influence; but, on the other hand, where it is weak, it is frequently resisted by the powerful influence of the khans, who form the aristocracy of the land, as their authority is also resisted by the inferior assemblies; and it sometimes happens that those assemblies differ with each other about the limits of their own powers; and hence the democratic tribes are often involved in dissension by this complicated collision of rival authorities. In the concerns of some of the tribes the king never interferes; he merely levies supplies of money for the public service, which, notwithstanding the presence of one of the royal sirdars, are frequently withheld or granted, according to the discretion of the khan: and in like manner the khan and the cauzy contend with more or less success, according to the state of the king's authority, for the exercise of the judicial power. One or two tribes, such as the Eusofzyes, in the eastern corner of the country, set the king at defiance, and boast of their independence. The country is divided into 27 provinces, in 18 of which the royal authority prevails, and the king's officers, the haukims and the sirdars, constantly reside. These are, Herat, Furrah, Candahar, Ghuzni, Cabul, Baumican and Ghorebund, Jellalabad, Lughman, Peshawer, Dera Ismael Khan, Dera Ghauzi Khan, Shekarpoor, Sewee, Sinde, Cashmere, Chuch Hazareh, Leia, and Mooltan. Several of these provinces, owing to the distraction of the country, have since aspired to independence; and in the other nine the royal authority carries little weight.

The government of the Afghans, though it contains in this manner the elements of freedom, fails entirely in the great end of securing to the community the blessings of good order and peace. The people are bold and independent, and spurn the restraints of law. Among such a variety of independent communities, imperfectly controlled by the royal authority, wars arise, which are waged with great fierceness, and in which the tumultuary militia of the tribes frequently come to blows, and waste each other's territories. Private revenge also, though prohibited by the laws, is sanctioned by manners: it is accordingly practised by all classes, and is accounted the unalienable right of every freeman. Hence family feuds arise, which are not only carried on with bitterness at the time, but being transmitted from generation to generation, produce a long-continued course of violence and bloodshed. Afghanistan, with its bold and turbulent aristocracy, and the rude independence of its people, presents a lively picture of the state of society in Europe under the feudal system, when every potent baron could defy the authority of the crown, and when, owing to the private feuds of the nobles, the whole country was frequently one general scene of rude commotion. But the liberty of the Afghans, notwithstanding all its disadvantages, is preferable to a state of despotism. The rude and stormy independence which they enjoy is calculated to give to the national character a manly and heroic cast, to inspire the Afghan with proud and elevated sentiments, and to raise him, in point of courage and intelligence, far above the wretched slaves of Asiatic despotism. The Afghan himself, far from desiring to exchange his disorderly independence for the peace of tyranny, glories in the freedom of his institutions, and it is well observed by Elphinstone, that a European visiting the country, however he might lament that the inhabitants were "trained by their unhappy situation to fraud and malice, to rapine, deceit, and revenge, could yet scarce fail to admire their martial and lofty spirit, their hospitality and their bold and simple manners, equally removed from the suppleness of the citizen, and the awkward rusticity of the clown; and he would probably before long discover, among so many qualities that excited his disgust, the rudiments of many virtues."

The judicial institutions of the Afghans, more especially where the royal authority is superseded, as it frequently is, by that of the khans, are rude and imperfect. There are no regular tribunals of justice, nor any organized systems of police. The popular assemblies of the tribes, composed of khans, mulliks, or elders, assisted by moollahs, and even by grave and experienced persons of inferior rank, discharge the functions of judges in criminal cases. Petty offences are settled by the elders of the village in which they occur; and in loosely governed tribes, every village or subdivision acts for itself. When the members are assembled, they hear the accuser's story; and after examining witnesses and other evidence, they proceed to give judgment. The right of private revenge, which is congenial to the habits of a barbarous nation, is but feebly restrained by the judicial tribunals. Among several tribes the adjustment of disputes is attempted by mediation and persuasion, to which the chief and the elders lend their influence. But if, notwithstanding this mediation, the aggressor refuses compensation, and the injured party to forgive, the latter is no longer restrained from pursuing his revenge. Among some tribes the obstinate party is compelled to yield obedience to the award of the court. The general law of the country is that of Mahomet; but there is the code of Pooshtoon-Wallee, or the peculiar usages of the Afghans, which has all the force of law. In towns justice is administered by the cauzy, who decides both in civil and in criminal cases, aided by the mooftees. There is an officer named Ameeni Mehkemeh, who takes charge of all deposits; and the Darogha of the Adawlut superintends the whole proceedings. There are also three officers who superintend the police of the towns. But in the judicial as well as the police departments the greatest abuses are said to prevail, and justice is frequently sold to the highest bidder.

Manners of the people.

The Afghans are strict Mahometans, and the moollahs or priests have great influence over them. They are looked upon with extraordinary reverence, and are especially powerful in the neighbourhood of Peshawer and other parts. They frequently gratify their private enmities by raising a charge of heresy against obnoxious individuals, and exposing them to persecution. In the remote districts of the country an insult to any of those personages would of itself be sufficient to raise a tumult. Being intrusted with the education of youth, the practice of the law, and the administration of justice, and in possession of all the learning and science which are to be found in the country, they take the lead in popular assemblies, or in judicial proceedings, and are frequently of use in moderating the violence of an ignorant people. In some circumstances they are enabled, by their superior knowledge and habits of business, to exercise an almost unlimited influence over individuals, and even over bodies of men; to check and control the governors and other civil officers; and sometimes even to overawe and control the power of the crown itself. Those priests are generally taught to read the Persian classics and the Arabic grammar, which they study diligently. They afterwards repair to Buckharia, or Peshawer, or some other seat of Mahometan learning, where they are initiated in logic, law, theology, and the system of physics known in the East, as well as in history, poetry, and medicine, which last is a favourite study. The moollahs are not so intolerant as Mahometans generally are; and the people, when they are not instigated by them, are still less disposed to religious persecution. The Hindoos in Afghanistan are allowed the free exercise of their religion, though they are prohibited from all religious processions or public exposure of their idols. But among so rude a people dissenters from the popular creed can have little security for their freedom; and among the Afghans, accordingly, there are not wanting some cruel examples of religious tyranny. Yet the Hindoos, though they are held to be impure, and though no strict man would consent to eat meat of their dressing, are employed in public situations of trust and emolument, and appear to enjoy as much security as the other inhabitants. All the Afghans are sent in their infancy to a moollah for education, by whom they are frequently taught nothing more than some prayers and passages of the Koran, and the ceremonies of their religion. A great portion of them remain consequently in a state of ignorance, and cannot read their own language. The rich maintain moollahs in their own houses, to teach their children, some of whom are taught to read the Persian classics and the Arabic. The Afghans have no literature of their own beyond a few patriotic songs or tales of love, of which passion they speak in the most romantic strain. The Mahometan religion exercises, as usual, its injurious influence on the character and condition of the women, who, especially among the higher classes, are shrouded in concealment. Polygamy is allowed, and any woman may be divorced at the caprice of her husband. Among the lower classes the women are more freely exposed, and do all the drudgery of the house, being forced to bring in water, and, among the ruder tribes, to do the work of the men out of doors. Slavery is allowed, as in all Mahometan countries. The greater part of the slaves are born at home; but supplies are received of Abyssinians, and negroes from Arabia; and of Persians from the inhabitants of Belochistan, who seize them in their forays. Caufirs are purchased from their own nation, or carried off by some of their own border tribes. These last are generally women, who are in great request on account of their beauty.

The low state of knowledge among the Afghans is evinced by some of their favourite studies and amusements. They are greatly addicted to alchemy and to magic; they have implicit faith in ghosts, in dreams, in the arts of divination, the power of talismans, and in the possibility of controlling genii and demons. Grown up men play at marbles. Prisoners base, quoits, and a game like hunt the slipper, are also common; as are wrestling and other trials of strength and skill. Fighting quails, cocks, dogs, rams, and even camels, are much admired. Some of their sports are, however, more manly. The chace is the favourite amusement of all classes, for which the abundance of game in the country affords ample scope. Horse-racing is common. An amusement of the better classes is to tilt with their lances, or to shoot at a mark with carbines or matchlocks on horseback; or with guns or bows and arrows on foot. They also practise a complicated sort of dance, which gives them great delight.

The Afghan women are described as large compared with those of India, and very fair and handsome. The men are all of a robust make, and are generally lean, though bony and muscular; and with high noses, high cheekbones, and long faces. Their hair is always coarse and strong, and they wear long and thick beards, which are generally black or brown, but rarely red. There is an expression of manliness and deliberation in their countenance, joined to an air of simplicity, not allied to weakness. The eastern Afghans have the natural features most strongly marked. Those of the western tribes are less distinct, and exhibit a greater variety of countenance, some of their features being the reverse of sharp, though their high cheek-bones never leave them. The western Afghans are larger and stouter than those of the east, some being of surprising strength and stature; but in general the Afghans are not so tall as the English. The eastern Afghans, owing to the heat of their climate, have generally dark complexions, approaching to that of the natives of Hindostan; while those of the west are olive, with a healthy colour and appearance. But among them, as among the eastern Afghans, are to be found men of swarthy complexions, like the natives of India; and others, again, as fair as Europeans. In the east, however, it is more common for the complexion to have a swarthy tinge than in the west. But the two races, the eastern and the western, are distinguished by still more striking peculiarities in their manners than in their complexion. Having derived their civilisation from the Persians and Indians, they each retain the usages of the respective nations with whom they have been connected. The Persian dress, language, and manners, distinguish the western tribes; and from the supremacy which two of these, particularly that of Dooraunee, have at times maintained over the whole, they decidedly prevail in the nation, and are even recognised where the Indian customs are more in repute. The manners of the Afghans are frank and open; sometimes rustic, but seldom fierce or insolent, except among the eastern tribe of the Eusofzyes, who have naturally an arrogant carriage. About towns they are more polished than in the country, and are accustomed to pay respect to their superiors. In all cases they show a great reverence for old age. They are altogether a superior people to the Hindostanees, being free from their puerility, and from the apathy which they display in all matters not bearing on their own interest; nor are they delighted with the baubles which form the most acceptable presents in India. The bulk of the people are rather remarkable for prudence, observation, and, though not very enlightened or enlarged in their views, for a rational spirit of inquiry. At Calcutta those that have seen the arsenal or the ships seem deeply interested in the superior improvements and knowledge of the English. And though they have not the same regard to truth as the Europeans, they do not indulge in the practice of gratuitous falsehood, to which the natives of Hindostan and Persia are universally addicted. From the nature of their country, which admits no travelling except on horseback, they are inured to cold and heat, and to the exertion of making long journeys, and of climbing mountains, and of swimming across rapid torrents. Old men who seem hardly able to sit on horseback will ride at a good pace up and down the steepest and roughest passes, or along the edge of precipices, where it is even dangerous to walk. They are hospitable to strangers under certain circumstances; but they are notorious freebooters, especially the mountain tribes, and plunder travellers without scruple.

The inhabitants of the towns differ in their origin and character from the cultivators and peasantry. The greater part of them in the western country consists of a race called Taujiks, originally descended from the Arabs and Persians; and in the east, of Hindikies, who are of Indian origin. No Afghan ever keeps a shop, or exercises any handicraft trade. Those employments are chiefly left to the classes mentioned above, and to the Persians, some of whom have acquired great wealth. The banking business is chiefly prosecuted by the Hindoos. They lend money at an enormous interest by negotiating bills of exchange; and they occasionally accommodate government with loans, for which they receive bills on the revenues of the provinces. Many of them are rich, and they conceal their wealth. Mr Elphinstone relates, that one of them, who gave him cash for bills on India, would only make his payments in the dead of night, when he dug up the money, and paid it with the utmost secrecy. There is a very strict police in the towns, which being exercised by the Mahometan priests, often affords pretexts for extortion. The food of the common people is leavened bread, rice, flesh, vegetables, sometimes cheese, and always dried curds, of which all classes are fond. Provisions are cheap, and there is a prodigious abundance of fruit.

Trade.

In an inland country such as Afghanistan, mountainous, destitute of navigable rivers or of proper roads, commerce is carried on entirely by beasts of burden. There are no wheeled carriages, and camels are the animals chiefly employed. The merchants travel at the rate of about 8 or 10 miles a day in large caravans, the roads often lying through close and craggy defiles, and narrow stony valleys, among bare mountains, or along the beds of torrents, or over waste plains, where there is neither water nor provisions. The principal trade is with India, Persia, and Chinese and Independent Tartary. The caravans which set out for Tartary consist of horses or ponies, which are alone able to traverse the mountainous roads that lie in one part over the snowy ridges of Hindoo Coosh. They set off from Cashmere and Peshawer. Cabul is the great mart of Independent Tartary, Candahar and Herat that of Persia. The trade from the north of India centres in Peshawer. That which crosses the desert from Jypore and other countries still farther south comes to Shekarpoor, Bahawulpoor, and Mooltan; and that which is carried on by sea comes to Koratchee, and thence to Shekarpoor and Candahar. The exports to Hindostan, which form by far the most considerable trade carried on by the Afghans, consist of horses and ponies, which chiefly come from Balk, on the northern side of the Hindoo Coosh Mountains; furs, shawls made at Cashmere, and fruits. The imports are coarse cotton cloths, which are worn by all the common people of the country; muslins, silken cloth, brocade, indigo in great quantities, ivory, chalk, bamboos, wax, tin, sandal wood, sugar, musk, coral, drugs, and spices of all kinds. To Independent Tartary the exports are chiefly white cloth, shawls, Indian turbans, chintz, and indigo previously imported from India. The imports are horses, gold, and silver; the latter consisting of the gold coin of Buckharia, Dutch ducats, Venetian sequins, and ingots of silver from China; cochineal, cloth, British hardware, looking glasses, Russian leather from Buckharia, to which place they come from Russia; also a fine cloth made of camels' wool. The exports to Persia are shawls and shawl goods, indigo, carpets of Herat, chintz, Indian brocades, muslins, and other cotton cloths. The imports are raw silk, silken stuffs, a coloured cotton manufacture, and silken manufactures, which are used in large quantities by all ranks; embroidered satin, velvet, and Persian brocade, which are confined to the rich. Indian chintz, manufactured at Masulipatam on the Coromandel coast, comes by sea to Busheer in the Persian Gulf, and is thence brought by land to Afghanistan, where it is much used. The exports to Chinese Tartary are the same as to Buckharia. The imports are woollens, Chinese silk and satin, tea in small boxes of thin lead, china, porcelain, raw silk, cochineal, crystal, gold dust, and ingots of gold and silver with the Chinese stamp.

Agriculture.

There are five classes of cultivators in Afghanistan: 1. the proprietors, who cultivate their own lands; 2. tenants, who pay a rent in money, or in part of the produce; 3. buzgurs, who, like the metayers, are supplied with seed, cattle, the implements of husbandry, and furnish only their labour; 4. hired labourers; and, 5. villains, who are the property of the landlord. From the influence of various causes, landed property is more equally divided than in most countries. The Mahometan law, which divides the father's property equally among his children, soon breaks down the largest landed estates; and rendering the portions too small for the support of their proprietors, they are consequently sold to those who have acquired wealth in public employments, or by agriculture or commerce. Hence small proprietors, who cultivate their own lands either with the aid of their families or labourers, are numerous. The number of tenants is not great; and many of these subset it to others, who let it to metayers. The common term of a lease is one or two years; the longest is for five. The rent varies from one-tenth to two-thirds of the produce, the latter being the rent of the fertile lands around Cabul. The value of land is from nine to twelve years' produce. Labourers in husbandry are paid by the season, which is about nine months. They receive, besides food and clothing, 30 rupees, equal to L.3. 10s. In towns the price of labour is 4d. a day with food; in Candahar it is between 6½d. and 7d. The price of provisions is incredibly low. In Candahar coin of the value of 1000 pence would purchase five pounds of wheat flour; and at Peshawer the price of flour to the British mission was 76 pounds for a single rupee of the value of 2s. 4d.

The Afghan nation is divided into a variety of clans, which we cannot even enumerate; nor does it appear to be necessary, since a mere list of names, even if it were given, would throw no light whatever on the peculiar character and manners of the different tribes. One important distinction, however, divides the community into two great classes; namely, the pastoral tribes, who live in tents, and who migrate with the seasons in quest of subsistence for their flocks and herds; and those again who follow agriculture, and have fixed habitations. The country of Afghanistan which is near the hills consists of flat and low-lying plains, or of strongly-marked ranges of mountains. Western Afghanistan has an entirely opposite character, consisting of extensive and open plains, inhabited chiefly by pastoral tribes. These wandering hordes select the grassy valleys among the mountains for their summer habitation; but the approach of winter warns them to go in quest of more genial regions; and they accordingly migrate, some to the lower valleys at the foot of the Paropamisan Mountains, some to the low countries in the south, and others of the more purely pastoral tribes, wandering from the mountain valleys of Khorassan, along the course of the Gomul, and across the Soliman hills, fix their winter habitations in the plains of Damaun, along the western shores of the Indus. The Dooraunees, who occupy a tract in the plain of Khorassan, 400 miles in length by about 148 in breadth, form one of the greatest pastoral tribes. It consists of many subordinate tribes, all of whom are more or less addicted to the wandering life; though a considerable proportion combine agriculture with pasturage, and have fixed residences. The pastoral part of the Dooraunee people are mostly to be found in the eastern hilly tracts near the frontiers of Persia, between Herat and Seestan, and in the waste plains of the south. To the south-east of Candahar the inhabitants are shepherds; in other parts of the country the husbandmen and shepherds are intermixed. North of Candahar, the migrating tribes seek the plains in winter and the hills in summer. Those to the south retire from the summer heat to the northern hills. The numerous tribes still farther south beyond the Helmund also quit the plains, which are thus left with scarcely a single inhabitant before the middle of spring. There are some tribes, such as the Naussers, who are purely pastoral in their habits, who live in tents, and have no fixed dwelling-place, and who regularly wander with the change of the season from their winter to their summer habitations. At the appointed time they assemble and march in a body, amounting to 30,000 people, with their numerous flocks and camels, and their whole possessions, and are encamped in about 200 tents. In the wild and solitary wastes of Khorassan they move in perfect security; but as they approach the populous parts of the country, they have to make their way through hostile tribes, who beset them in the mountain passes, and either attack the main body or cut off the stragglers. Hence they are compelled to adopt the strictest precautions. Scouts are planted on all sides, the flanks and rear are protected by armed bands, and the main body advances with all the caution and exact discipline of a regular army. These shepherds are all plunderers; and no single travellers, if they are rich, are safe in any part of the country. They are fierce and warlike in their actions, and enterprising in their habits; yet are they capable of strong attachments, and are keenly alive to the force of social and domestic ties. In distant countries they dwell with the fondest enthusiasm on the valleys of their native land, on the varieties of its scenery, on the beauties and delights of spring, and on all the pleasing vicissitudes of their wandering life; and it is seldom that they quit their own happy abodes for foreign adventures. Their camps usually consist of from 10 to 50 tents. One hundred is an unusually large number. The tent is formed of coarse black camlet, and affords excellent shelter from the weather, the threads of the blanket swelling as soon as they become wet; so that its texture, naturally close, is rendered quite impervious to rain. The tents of the common people are from 20 to 25 feet long, 10 or 12 feet broad, and 8 or 9 feet high. The tents of the khans are of a superior description, being large enough to contain a numerous assembly, and so high as easily to admit a camel.

Population. Mr Elphinstone estimates the population at 14,000,000, to which he supposes that the different natives who inhabit the country contribute in the following proportions: Afghans, 4,300,000; Beloches, 1,000,000; Tartars of all descriptions, 1,200,000; Persians, including Taujiks, 1,500,000; Indians, Cashmeres, &c. 5,700,000; miscellaneous, 300,000.

History. The Afghans, like most barbarous nations, derive their origin from high antiquity. They claim their descent from Afghan, the son of Irmia or Birkia, son of Saul, king of Israel; but this is a vain tradition, which is unsupported by the slightest historical evidence. The first account we have of them is in the 9th century, when they were established in the north-eastern mountains of Afghanistan. In 997 Afghanistan was conquered by a Tartar officer, Sebuctaghi, who made Ghuzni or Ghizni his capital. His son Mahmood greatly enlarged the limits of his empire, which extended over the present kingdom of Cabul, India, Balkh, Badukshan, and a great part of Khorassan. His dynasty lasted till the year 1159, from which period till the invasion of Baber in 1506, different dynasties reigned in Afghanistan with some interruption. The country was subdued by Ghengis Khan and Tamerlane; and during their government, and that of their descendants, the native Afghans appear to have maintained their independence in the mountains. Baber, the descendant of Timour, began his career by the conquest of Cabul, which was his capital till the end of his reign. On his death his sons extended their conquests into India. Their capital was transferred to Delhi; and the plains of Afghanistan were divided between the empires of Hindostan and Persia, while the mountains as before afforded an asylum to those who rejected a foreign yoke. In 1720 the Afghan tribes threw off their allegiance to Persia, and advancing into the country, took Ispahan. But in 1728 they were driven back by the celebrated usurper Nadir Shah, who pursuing his success, in the year 1737 subdued the whole of Afghanistan. He established his power over all the countries to the west of the Indus, which continued subject to Persia till his assassination in 1747. On this event an Afghan officer of the Dooraunee tribe, Ahmed Shah, who had risen to high command in Nadir's army, took possession of Candahar, and having united all the Afghans under his authority, founded the present kingdom. He was a wise and politic prince, who united courage and activity with great military talents. He invaded Hindostan at different times; and in the memorable battle of Paniput, fought in 1761, on the 7th January, he gave a decisive blow to the Mahratta power. He died in 1773, and was succeeded by his son Timour Shah, whose indolence was as noted as his father's activity. He died in 1792, after a despotic reign, leaving his dominions to his two sons, Homayon and Zemaun Shah. War soon broke out between the two brothers; and the elder being defeated, the whole kingdom acknowledged the authority of Zemaun Shah. In 1796 this prince invaded Hindostan with a large army, and advanced to Lahore; but he was obliged to retreat in consequence of an insurrection in his own country. In 1800 Zemaun Shah was dethroned and deprived of his sight by his brother Mahmood. He was in 1803 expelled by his brother Shuja, who was in his turn expelled by Mahmood in 1809, and had a pension assigned him of 50,000 rupees per annum. Meantime Runjeet Singh, the Seik chief of Lahore, profiting by the confusion, conquered Peshawer, the modern capital of Afghanistan. In 1818 Shah Shuja, impatient of retirement, attempted to regain his former dignity; but failing in this, he was, with a lenity not common among Asiatic conquerors, allowed to retire with his pension; and at the same time a pension was assigned to his blind brother Zemaun Shah. The two rival competitors, Mahmood and Shuja, were in 1826 quietly residing, the latter within the British territories, and the former with his son Camram, at Herat. The country was then partitioned among the sons of Futteh Khan, and Yar Mahomed Khan was ruling at Peshawer. (*An Account of the Kingdom of Cabul and its Dependencies in Persia, Tartary, and India*; by the Hon. Mountstuart Elphinstone.) (F.)

AFRAGOLA, a large manufacturing town in the kingdom of Naples, and in the province of Napoli. It has three parish churches, and contains 12,640 inhabitants, who produce, among other goods, 6000 dozen of hats annually.

AFRANIUS, Lucius, a Latin poet, who lived about a century before Christ. He wrote comedies in imitation of Menander; and is commended by Tully and Quintilian for his acute genius and fluent style. Only some fragments of his works are now extant.

AFRICA.

Ancient geography of Africa. Egypt.

THE knowledge which ancient writers have transmitted to posterity, of this great continent, is of very limited extent, owing principally to its physical construction. The desert of sand, which in a broad belt stretches quite across the continent, forbade every attempt to pass it until the introduction of the camel by the Arabs. The want of any known great river, except the Nile, that might conduct into the interior, contributed to confine the Greek and Roman colonists to the habitable belt along the northern coast. We know, however, from unquestionable authority, for so we deem the sacred records to be, that 4000 years ago the grandson of Ham fled to and settled in Egypt or Misraim, names which that country has preserved to the present day; and that 3600 years ago it was as well or better known to eastern nations than any part of Europe was at that time. The latter, indeed, may be said to have received the germs of civilisation from the Egyptian colonies on the shores of the Mediterranean; for we have sufficient proof that Egypt had reached to a considerable degree of civilisation in the patriarchal ages, from the circumstance of the sons of Jacob proceeding thither out of Asia to purchase corn; for a commerce in grain implies civilisation. The Carthaginians are also known to have formed establishments on the northern coast of Africa at a very early period of history, certainly not less than 2700 years ago; and the conquest of Egypt by Cambyses dates as far back as 2300 years. We may consider, therefore, the coasts of Egypt, of the Red Sea, and of the Mediterranean, to have been settled and well known to the ancient Asiatics, who were constantly passing the narrow isthmus which divided their country from Africa, and led them immediately from parched deserts into a fertile valley, watered by a magnificent river. But whether they were much or little acquainted with the western coast, which bounds the Atlantic, and the eastern coast washed by the Indian Ocean, is a question that has exercised the research and ingenuity of the ablest scholars and geographers, and has not yet been satisfactorily answered.

Western coast.

This question being one of curiosity rather than utility, we shall only state the case, and the results of the several inquiries, without entering into the merits of the arguments advanced by the different parties. We are told by Herodotus, that Necho, king of Egypt, sent out an expedition under the command of certain Phœnician seamen, for the purpose of circumnavigating Africa; and that, on their return, they asserted that they had accomplished this undertaking. Few of the ancient writers give credit to the story; but, among the moderns, the Abbé Paris and Montesquieu have contended that this voyage was actually performed. Isaac Vossius and D'Anville have strong doubts; and Dr Vincent and M. Gosselin maintain that such an expedition, at such a period, exceeds all the means and resources of navigation, then in its infancy. Last of all comes Major Rennell, who, in his elucidation of the geography of Herodotus, has done more than all the rest in clearing away the doubts of history; and *he* argues the possibility of such a voyage, from the construction of their ships, with flat bottoms and low masts, enabling them to keep close to the land, and to discover and enter into all the creeks and harbours which any part of the coast might present. At all events, one thing is evident: if such an expedition ever left the Pillars of Hercules, and proceeded down the coast, the fruits of it have nearly, if not entirely, perished.

About half a century after this supposed expedition, the account of another voyage, down the western coast, is contained in the *Periplus* of Hanno, which has also called forth many learned and elaborate discussions among modern geographers. The principal persons engaged in this controversy were Bougainville, Rennell, and Gosselin, the several results of whose researches will be seen in the following table; the first column of which exhibits the description of the successive lines of coast, and their most remarkable features, as given by Hanno, who commences his narrative from the Pillars of Hercules or Straits of Gibraltar. The others show the correspondent modern positions, as severally assigned by these three distinguished geographers.

DESCRIPTION OF OBJECTS ON THE COAST, AS GIVEN BY HANNO.	MODERN POSITIONS, ACCORDING TO BOUGAINVILLE.	RENNELL.	GOSSELIN.
Thymaterium, overlooking a vast plain (two days' sail)	Cape Cantin	Near Mamora	Cape Mollabat
Promontory of *Soloeis*, covered with trees	Cape Bojador	Cape Cantin	Cape Spartel
A day's sail; five cities founded; then arrive at the great river *Lixus*, flowing from Libya	Rio d'Ouro	Difficult to place	River Lucos
After sailing two days west and one day east, arrive at the island of *Cerne*	Arguin	Arguin	Fedala
A large river called Chretes	River St John	River St John	River Rebeta
A bay or lake, with several islands larger than Cerne	Islands near its mouth	Islands near its mouth	Lake of the Negroes
A large river, full of crocodiles and hippopotami	The Senegal	The Senegal	River Subu or Saboe
Return to Cerne; twelve days' sail along the coast of the Ethiopians; then a *Cape*, formed by mountains covered with odoriferous trees, doubled in two days	Cape St Anne near Sierra Leone	Cape Verde	Cape Geer

DESCRIPTION OF OBJECTS ON THE COAST, AS GIVEN BY HANNO.	MODERN POSITIONS, ACCORDING TO BOUGAINVILLE.	RENNELL.	GOSSELIN.
Five days' sail along an immense gulf	To Cape Palmas	To Cape Roxo (embouchure of the Gambia)	Gulf of Santa Cruz
A gulf called the *Western Horn;* large island with a salt water lake. Fires, with music, and loud cries during the night. Three days' sail	To Cape Three Points	Gulf of Bissago	To Cape Nun
Large flaming mountain called the *Chariot of the Gods*	An extinguished volcano	Sagres	Fabulous
New gulf called the *Southern Horn*, at which the voyage terminated. Another island and lake. *Gorillæ* (oran outangs)	Gulf of Benin	Sherbro Sound	To the river Nun

Eastern coast.

The extent to which ancient discovery proceeded along the eastern coast of Africa, has divided the opinion of the learned nearly as much as its progress on the western coast. Delisle, Huet, and Bochart, made the discovery of the coast to extend as far south as Mozambique and Madagascar. D'Anville could trace such discovery no farther than to Cape Delgado; and M. Gosselin contends that the ancients never proceeded down the coast beyond Brava. But Dr Vincent, who has entered more profoundly into the subject than any of his predecessors, and brought a great fund of learning to bear on the question, in his *Periplus of the Erythrean Sea*, has with great plausibility extended these boundaries to Mozambique and to the island of Madagascar. The following table exhibits at one view the comparative nomenclature and supposed identities of the several places on the coast, as found in the two ancient authorities and the two modern commentators; and also the description of the coast.

DESCRIPTION OF THE COAST.	ANCIENT NAME IN PERIPLUS.	PTOLEMY.	MODERN POSITIONS, ACCORDING TO GOSSELIN.	VINCENT.
The cape at which the coast turns to the south	Aromata	Aromata	Cape Guardafui	Cape Guardafui
A promontory and mart	Tabai	Pano Vicus		Cape d'Orfui
A considerable mart	Oponè	Oponè		Bandel Caus
A promontory .		Zengifa	Cape d'Orfui	Bandel D'Agoa
A mountain with three summits		Phalangis Mons		Morro Cobir
Two successive gulfs	Apokapa the less	Apokapa	Cape Delgado	Zorzella
	Apokapa the greater	Southern Horn	Bandel Caus	Cape Baxas
Azania	Little coast Great coast	Little coast Great coast	No objects	No objects except Magadoxo
A port			Unknown	Brava
A promontory and port	Serapion	Serapion	Cape Baxas	
A harbour	Nicon	Nici		
Anchorages at mouths of rivers	Seven in succession	None mentioned	No traces to be found	Mouths of the Obii or Quillimanci
Islands merely named	The Pyralaan		Unnoticed	Formed by its branches at Melinda, Mombaca, &c.
A low wooded island 300 stadia from land	Eitenenediom—Menouthesias (Menuthias)	Occurs afterwards	Misplaced	Monfia
A promontory and great emporium (termination of the Periplus)	Rhapta	Rhapton	Bandel veilho (mouth of the Doara)	Quiloa
An island 5° W. long. from Prasum		Menuthias	Magadoxo	Madagascar
A promontory, port, and river, the limit of ancient knowledge on this side of the continent		Prasum	Brava	Mozambique

Egypt, under the Ptolemies, the great patrons of science and promoters of discovery, possessing the advantage of the only great river which falls from the African continent into the Mediterranean, made no progress beyond its ancient boundaries; and though the Romans, who subsequently colonized Egypt, penetrated beyond the limits of their own dependencies, they extended their discoveries no farther than Fezzan in one direction, and, at a later period, beyond Nubia as far as Abyssinia. But the source of the Nile eluded their research, and is still but imperfectly known, from the account of it as given by Bruce, who appears to have borrowed a portion of his description of Gondar from Tellez and Payz. If we admit, what seems to be the fact, that the Bahr-el-Abiad is the main branch from which the Nile derives its supply of water, the source of this celebrated river is still unknown; and we may say with the poet,

> .... in extremum fugit perterritus orbem,
> Occuluitque caput, quod adhuc latet.

The Carthaginians. We know nothing of the progress made by the Carthaginians in the discovery of interior Africa; but although it has been asserted that their merchants had reached the banks of the interior river, which we call the Niger, they have left nothing on record that will warrant such a supposition. The story told by Herodotus at fourth hand, of some Nasamonians crossing the desert and arriving at the same river, appears to be deserving of very little credit.

The Arabs. The people from whom we derive the first information concerning the interior of Northern Africa are the Arabs, who, by means of the camel, were able to penetrate across the great sandy desert to the very centre of the continent, and along the two coasts as far as the Senegal and the Gambia on the west, and to Sofala on the east. On this latter coast they not only explored to an extent far beyond any supposed limits of ancient discovery, but planted colonies at Sofala, Mombas, Melinda, and at various other places.

The Portuguese. The fifteenth century produced a new era in maritime discovery. The voyages of the Portuguese were the first to give any thing like an accurate outline of the two coasts, and to complete the circumnavigation of Africa. The discovery of America and the West India islands gave rise to that horrible traffic in African negroes, which has since been carried on without intermission; and this traffic has been the means of acquiring a more extended and accurate knowledge of that part of the coast which lies between the rivers Senegal and the Cameroons, as well as of the manners and character of the people who inhabit this extended line of coast. The English settlements along this line gave opportunities for making surveys, and occasionally of visiting certain portions of the interior. Still more recently, a regular survey has been made by Captain Owen of the navy, between the Cape Guardafui or Guardefan, in the Arabian Sea, to the Cape of Good Hope, and thence continued to the Gulf of Guinea, the completion of which is now (1829) in progress, as far as to the Straits of Gibraltar.

African Association. The uncertainty and the confusion that prevailed in the geography of the interior of Africa, induced a few learned and scientific individuals to form themselves into an association for promoting discoveries in the interior of Africa; under whose patronage those important additions made by Houghton, Hornemann, Mungo Park, and Burckhardt were effected, and under which an individual, who had travelled as draughtsman to Mr William Banks, has more recently been employed in exploring the source of the Bahr-el-Abiad. **Congo expedition.** In consequence of an opinion given by Park and Maxwell, as to the southern course of the Niger, an expedition was fitted out by the government to explore the source of the river Congo, under the direction of Captain Tuckey, the result of which did not add so much to our information respecting that great river and surrounding country as might have been expected, owing to the great mortality of the party, occasioned, as it would seem, more from imprudent exposure and exertion, than from unhealthiness of climate. **Discoveries of Oudney, Denham, and Clapperton.** The next attempt to push discovery into the interior of Africa was the mission of Oudney, Denham, and Clapperton, from Tripoli to Bornou, under the auspices of government; which was followed up by another under Clapperton, from the Bight of Benin to the same part of the country which he had reached on the first journey; thus supplying a complete series of observations for the latitudes and longitudes, from the Mediterranean to the Gulf of Guinea. These two expeditions have cleared away all those conjectural speculations of the courses of rivers, ranges of mountains, and positions of lakes and cities, many of which are now ascertained to have no existence; while others that do exist are found to have been placed on the maps several hundred miles out of their true situations, to the utter confusion of topographical consistency. In short, our maps of this great continent were very little better than those of the sixteenth century, wherein, as Swift facetiously says,

> Geographers, in Afric maps,
> With savage pictures fill their gaps;
> And o'er uninhabitable downs
> Place elephants for want of towns.

In consequence of the recent expeditions and surveys above mentioned, and a variety of other information, we are now in a condition to give a far more accurate and detailed account of this great continent than has appeared in any former edition of this work. It may be right, however, in the first place, to take a general and comprehensive view of this quarter of the globe, on which will be found to exist many peculiarities to distinguish it from the other continents.

General description of Africa. Africa is separated from Asia by the Isthmus of Suez, and from Europe by the Straits of Gibraltar; stretching from the equator to about the average latitude of 35° N., and also to the same degree of latitude south. It embraces every variety of temperature, from extreme heat to the mildest of European climates, the softness and salubrity of the latter of which are experienced in the Barbary States, and at the Cape of Good Hope. On the other hand, its tropical regions, especially on the sea-coast, are most destructive to Europeans who attempt to settle in them, by diseases occasioned by a rich and swampy soil, clothed with an exuberant vegetation. **Dimensions.** The greatest length, from north to south, is from Cape Serrat in Algiers, in lat. 37. 18. N., to Cape Laguillas, in lat. 34. 55. S.; and the greatest breadth, from Cape Verde, in long. 17. 31. W., to Cape Guardafui, in long. 51. 15. E. Its mean length may be estimated at about 4000, and mean breadth at 2000 miles, containing an area of 8,000,000 geographical miles. The northern portion of this great continent is fully twice the size of the southern portion, and may be considered as about equal to South America. South Africa is contracted to half the width of the northern part, and is, as nearly as may be, about the size of Australia or New Holland. The inspection of a map of the world would induce one to conclude, that the two continents of Africa and America were once united; the bulging part of the former fitting in exactly to the Gulf of Mexico; and the bulging part of South America, about Paraiba and Pernambuco, being about the size and shape to fill up the Gulf of Guinea.

Mountains. Africa has neither the lofty mountain chains nor the magnificent rivers of the opposite continent of America. Of the mountains, those of the greatest height that are actually known are the great cluster of the Atlas, one chain of which runs southerly to the desert of Zahara, and another easterly to the neighbourhood of the Syrtes; two or three points of which are said to be perpetually covered with snow, which would give them an elevation of from 12,000 to 13,000 feet. The cluster of Abyssinian mountains, on the opposite side, are very similar in their shape and grouping to those of Atlas. Those parts which lie in the provinces of Tigré and Gojam, from being almost constantly covered with snow, may be considered as about the same height as those of Atlas. The Kong mountains, which were supposed, and are so drawn in the maps, to run across the continent in one unbroken chain near the equator, are of doubtful existence as to their continuity. Where crossed by Clapperton, they nowhere rose to the height of 3000 feet; but they were of granite; and a few degrees to the southward, and behind the river Cameroons, two or three lofty peaks are visible from the sea, which appear by triangulation to be from 13,000 to 14,000 feet. Along the eastern coast, one continued chain extends from the Abyssinian range to the Table Mountain of the Cape of Good Hope, but of no great height, as far as known. Perhaps we may consider the continent of Africa as one great plateau, supported by littoral chains, presenting their steep sides seawards, and sloping gently into the interior, in which many rivers will be found to descend from them, that in all probability never reach the ocean.

Rivers.

All the rivers discharged into the Mediterranean, with the exception of the Nile, are small mountain streams. The same is the case from Ceuta along the western coast to the commencement of the desert, a distance of about eight degrees of latitude. On the coast of the Zahara there are no rivers. The Senegal, the Gambia, and the Rio Grandé, are rivers of considerable magnitude, and each has its source in the same system of mountains. But it is into the Gulf of Guinea that the largest rivers of Africa discharge their waters. The Volta, the Benin or Formosa, the Bonny, the Old and New Calabar, the Rio del Rey, and the Cameroons, are all of them large rivers; but nothing is known of them farther than some forty or fifty miles from their mouths, and they have been supposed, except the last two, to be branches of one and the same river. Farther down, and near the equator, are the Angra, the Gaboon, and the Lopez, all of which, with the others, probably derive their sources from the range of lofty peaked mountains which have been mentioned as seen from the sea. Still farther south is the great river Zaire or Congo, and lower down still the Coanza, and a few smaller ones, comprehended within the Portuguese settlements, which extend from about lat. 6. to 16. S. From hence to the Cape of Good Hope, with the exception of the Gariep or Orange River, there is none deserving of notice. On the eastern coast the rivers are much smaller, but more numerous. From the Isthmus of Suez, along the whole coast of the Red Sea, and from Babelmandel to Cape Guardafui, and from this cape to Pattah, in lat. 2. 15. S., opposite to which is the river Obii or Zebee, there is not a stream of any note throughout the distance of 2500 miles. In proceeding hence southerly we have the Quilimancé, Mombas, Monghow or Mongallow, Mozambique, Quiloa, Lindy, Quillimané, Jambezé, Sofala, Inhambané, and Marfooma and Mapoota, which fall into De la Goa Bay. From hence to the Cape of Good Hope a few streams of little importance fall into the Eastern Ocean.

Face of the country.

A very short description will suffice to give a general outline of the surface of Africa. Between the Straits of Gibraltar and the Gulf of the Syrtis, which is about two-thirds of the Mediterranean coast, the country exhibits a broken chain of mountains, interspersed with fertile valleys, in width extending between the 35th and 29th parallels, or about 360 miles. The rest of this coast, including Egypt (which, with Abyssinia, extends to the 12th parallel), is generally composed of fine fertile hills and dales and valleys, mixed, however, with deserts, in which are a few insulated spots of verdure, known by the name of *oases*. This portion of Africa belongs (with the exception of Egypt) to the Barbary states of Tripoli, Tunis, Algiers, and Morocco. The next region, proceeding southerly, is the Zahara or great sandy desert, lying between the 29th and 16th parallels, or about 780 miles in breadth, and extending across the continent, from the Atlantic to the borders of Nubia. It is inhabited only by wandering pastoral tribes, who move about from one oasis to another, where a little verdure may be found. Some of these tribes add, to the scanty means of subsistence, the plunder of such feeble caravans as they may venture to attack, and others are employed in collecting salt and natron for the markets of Bornou and Soudan. The third region is that of Soudan, or the country of the negroes, extending in a belt quite across the continent as far as Abyssinia, and from the 16th to the 5th parallels, or about 660 miles in width; a rich and fertile region, yielding, with little labour, all the valuable productions of tropical climates. Beyond the latter degree of latitude we are in utter ignorance of what the rest of North, and the whole of South Africa may contain, with the exception of the Cape of Good Hope and the Portuguese settlements on the eastern and the western coasts, between which they are said at one time to have kept up a communication; but if so, they have taken good care to keep to themselves whatever knowledge of the intermediate country they might have acquired. The colony of the Cape, on the southern angle, extends not above 500 miles on either coast from that promontory. Thus, then, there still remains a tract of country at the least 30 degrees of latitude, by 25 of longitude, or about 2,600,000 square geographical miles, of which nothing whatever is known.

Vegetable productions.

The vegetable productions of a country which embraces such a variety of surface, soil, and climate, must necessarily be very varied. There is, however, a great similarity in those, both of the vegetable and animal world, which exist in the two temperate extremities; and most of the larger kinds of animals, peculiar to this continent, are found in every part of it, north and south of the line, except perhaps in Egypt, which is too thickly inhabited, and on the broad belt of the desert, where there is nothing for them to subsist on. At the two extremities, the forest trees are not remarkable, either for their exuberance of growth or their utility in naval and civil architecture, machinery, or domestic uses. In the valleys, and on the sides of the hills of Mount Atlas, are extensive forests; but in no other part of the northern region. The erythrina, several mimosas or accasias, particularly the mimosa nilotica, numerous species of euphorbia and cactus, of rhamnus, aloe, and the huge adansonia, are found in the most arid soils, even on the great desert, but there in a more dwarfish state. The scanty vegetation, however, that partially appears on the surface of this "land of perpetual thirst," this "*leonum arida nutrix*," is mostly confined to the more humble tribe of mysembri-anthema, salsolæ, salicorniæ, gnaphaliæ, and a few other species of saline and succulent plants, which are able to support a feeble existence in a soil unrefreshed by rain or moisture. The southern extremity of Africa enjoys, in addition to the northern Flora, the magnificent family of proteas, and innumerable species of the elegant heaths. The tropical regions, it is almost unnecessary to add, abound with forests of the finest timber trees, many of them of dimensions that can scarcely be credited. The finest naval timber, stated to be superior either to oak or teak, is imported from the western coast of Africa, chiefly from the neighbourhood of Sierra Leone and the River Gambia. Throughout Soudan, wherever there is soil, vegetation is most vigorous, and much more labour is requisite to keep it under, than would be necessary for the cultivation of alimentary and other useful plants, if the ground were once cleared.

Those vegetable productions which are raised by the hand of man, and which administer to his sustenance, his clothing and shelter, and also to his other comforts, are abundantly supplied, without severe labour, in all parts of this continent, with the exception of the sandy desert. In the tropical regions, near the coast, they have the two most useful trees, the cocoa-palm and the common species of palm, which supply them with oil and wine. They have citrons, lemons, oranges, pomegranates, plantains, and bananas; rice and Indian corn, and various other useful plants, the introduction of some of which they owe to the Portuguese; perhaps the only benefit conferred, in compensation for the many evils inflicted by them on this unfortunate people. In the interior they have figs, pomegranates, plantains, abundance of fine yams, melons, gourds, and pumpkins; earth-nuts, colycynth, dourrha, and other kinds of millet; maize or Guinea corn, rice, vegetable butter, sweet potatoes, onions, and pepper. But the dourrha is the grain chiefly cultivated; and from this, with a mixture of pepper and honey, they make the fermented beverage, known in almost every part of Africa under the name of *booza*, with which the negroes delight to make themselves intoxicated. Cotton and indigo are everywhere cultivated with the greatest ease; and they have plants which afford them dyes of every shade of colour for their cloths. In the temperate parts of the continent, the finest grain of every species is produced, not excluding the maize and millets; every kind of European fruits and vegetables, and many of the tropical ones, particularly oranges, lemons, and limes. All the varieties of grapes, figs, peaches, and apricots, are of the richest and most delicious flavour; but apples, pears, plums, and cherries, are found to deteriorate, both at the northern and southern extremities. Melons, pumpkins, and every species of pulse, are as fine as can be produced in any part of Europe. In the northern portion grows the rhamnus lotos or jujube, on which the lotophagi of the ancients are supposed to have fed; and on the skirts of the desert, that most useful tree the date-palm grows in whole forests, affording a very considerable part of the subsistence of the natives.

Animals.

Man.

Negroes the probable aborigines.

It would require a volume to name the several objects in the vegetable world. We proceed, therefore, to take a glance at the animal part of the creation; and first, as being most important, of its lord and master, Man. The first peopling of any country is always an object of curious research, though rarely productive of a satisfactory result. If we admit the grandson of Ham to have settled in Egypt, perhaps we shall not err in considering the rest of Africa, at least of tropical Africa, to have been originally peopled by the negroes, and every other race of man now found on it, whether pure or mixed, to be adventitious. This hypothesis is grounded on the fact, that all the people now in Africa, except the blacks, can be traced to an Asiatic origin; while no negroes were ever found, except as slaves, in Asia, though they are met with on some of the Asiatic islands. Whether this nation, now confined to the tropical regions, were ever in possession of the two extremities of the continent, it were in vain to inquire; but, considering their indolent disposition, which makes them averse from labour, and anxious to avoid it whenever it is possible, their great delight being to bask in the sun all day, and to sing, dance, drum, and drink *booza* all night, we may naturally suppose they would make choice of a country where all the necessaries of life are either produced spontaneously, or with the least possible exertion of those who are to use them. This is not the case in the extra-tropical regions of Africa, where labour is required to render the soil productive. It has been conjectured, on grounds slender enough—the features of the sphynx—that the ancient Egyptians were negroes; the lips, however, are the only negro feature in that extraordinary piece of sculpture. But were it completely negro, it would prove nothing, unless it could be shown that this statue was more ancient than all the temples of Egypt—the Memnonium, Epsambul, Tentyra, the tombs of the kings of Thebes, and many others—in all of which the sculpture and the paintings of the human figure are invariably represented with features that approach nearest to the Persians, that original hive, as Sir William Jones has supposed, of the human race, or at least of the greater portion of the orientals. The negroes are by nature a harmless and inoffensive race, and their easy and timid disposition has been turned to their disadvantage, by the facility with which they have suffered themselves, and still submit, to be dragged from their country and friends into a state of foreign slavery. Domestic slavery has undoubtedly existed in all times among the negroes, as well as among other nations, and without being considered as an evil; but the peculiarly unfortunate lot of the negro is that of being torn away from all his connections, never to see them again. In the interior, the slaves are as happy and cheerful as their masters, and treated just as well; and strangers are received by them with cheerfulness, kindness, and hospitality.

Considering, then, the negroes as the sole aborigines of Africa, and the other races inhabiting this continent as capable of being traced to an Asiatic origin, the numbers that have poured in are easily accounted for, by the facility with which the Isthmus of Suez afforded them a passage, like a bridge, from one continent to the other. They may be classed, according to the purity of their race, as follows: the Berbers, the Moors, the Arabs, and the Turks; of the mixed breeds, the Copts, Nubians, and Abyssinians, are not greatly dissimilar; the Caffres (Kafirs) or infidels of the eastern coast are obviously of Arab and negro extraction; and the Hottentots, crammed into one single and the most distant corner of Africa, if not an original race, are, it must be admitted, a most singular anomaly among mankind. Of the Jews it is unnecessary to say any thing, as they are scattered over the whole world, and everywhere the same.

Berbers.

The Berbers are probably the most ancient inhabitants of the northern belt of Africa. The authors of *Mithridates* seem to consider them as the remains of the ancient *Getula*, to the west of Mount Atlas, and of the Libyans to the east. But from whence did these two people proceed? At present they are found in different parts of the continent under different names. The Shillas in the mountains of Morocco, the Kabyles in the mountains of Algiers and Tunis, the Tibboos in the eastern part of the great desert, and the Tuaricks in the western and central parts of the desert, may all be considered as emanating from the same race. They all speak different modifications of the same language, which, though written in a character wholly distinct (if Oudney be correct) from every other existing, is said to partake of the Hebrew and Phœnician. Mr Marsden, who has paid great attention to the subject, has traced this language from the extreme east to the extreme west of Northern Africa, and conjectures that it may have been the general language of the northern part, antecedent to the period of the Mahometan conquests; and that so marked is its affinity to certain forms of the oriental languages, as to make it not unreasonable to consider it as connected with the ancient Punic; an opinion in which M. Langlés is disposed to concur. They are a stout hardy race, of a complexion varying in hue from white to almost black, according to the exposure they have endured, and the degree of latitude they inhabit. Their form is generally well made, tall and thin, their carriage erect and independent. They are most abstemious, their food consisting chiefly of coarse brown bread, dates, olives, and water. Even on the heated desert, where the thermometer generally is from 90° to 120°, they are clothed from head to foot; and they cover the face up to the eyes with a black or coloured handkerchief. Those who inhabit the desert live by plundering the caravans from Morocco to Soudan, or by carrying salt to Timbuctoo, Kano, and even as far as Soccatoo. Lander, the servant of the late Captain Clapperton, describes a troop of 500 camels laden with this article for the Soccatoo market. "They were preceded," he says, "by a party of 20 Tuarick salt merchants, whose appearance was grand and imposing. They entered at full trot, riding on handsome camels, some of them red and white, and others black and white. All the party were dressed exactly alike. They wore black cotton tobes and trousers, and white caps with black turbans, which hid every part of the face but the nose and eyes. In their right hand they held a long and highly polished spear, whilst the left was occupied in holding their shields and retaining the reins of their camels. The shields were made of white leather, with a piece of silver in the centre. As they passed on, their spears glittering in the sun, and their whole bearing bold and warlike, they had a novel and singular effect, which delighted me." They are, however, a very dirty people, and never wash themselves. Water, they say, was given to man to drink, and that it does not agree with the skin of a Tuarick, who always falls sick after much washing. They have partly embraced Mahometanism, and make use of water to perform their ablutions. They are exceedingly superstitious; and their whole clothing, spears, swords and muskets, if they have them, are covered over with charms.

Tibboos. The Tibboos are apparently of a less pure race than the Tuaricks, being much more slender in their shape, having softer features, of a dark shining colour, nearly black, but with little or no appearance of the negro features. The women are described by Lyon as models of black beauties, full of vivacity, and fond of music and dancing. On the desert they frequent all the wells and wadeys, or little oases, with their sheep and goats. Neither the men nor the women cover their faces, but have the same bold independent gait as the Tuaricks. The men are great traffickers in slaves to Bornou, Kanem, and Baghermi, which they carry to Fezzan, Tripoli, and Egypt, in exchange for horses, which they sell at a high rate to the Bornouese. They are reported to be great thieves, laying wait to rob the caravans between Tripoli and Bornou, but never daring to attack them openly. Poor as they are, they are constantly exposed to the predatory excursions of the more fierce and warlike Tuaricks, who carry on their marauding expeditions to the very frontiers of Bornou and Soudan. The language of these several tribes of Berbers of the desert, as far as the few vocabularies extend, has been found to be very nearly the same.

Moors. The Moors are numerously spread over that northern belt of Africa which is known, as we have already said, by the name of the Barbary States. They are a handsome race of men, resembling in their stature and features the best formed Europeans or western Asiatics, but of a darker complexion. They are more robust than the Arabs, their features more full; but they speak a dialect of the Arabic, abounding in expressions, however, that are peculiar to themselves. They are supposed to be the descendants of the ancient Mauritanians, from whom they derive their name, mixed perhaps with the Numidians, and subsequently the Arabs; and as Sallust says that the Numidians and Mauritanians were originally descended from an Asiatic colony composed of Armenians, Medes, and Persians, a comparison of the Moorish with these languages might prove interesting to the philologist. The Moors are described as a cruel, revengeful, and blood-thirsty race. They abound most in Morocco and Tripoli. The emperor of the former state was of the race of Moors that conquered Spain, but since 1547 the posterity of Mahomet has sat on the throne; but the pasha of the latter state is of the Moorish race. The reigning family of both the one and the other, have been guilty of such atrocious and cold-blooded acts as make human nature shudder. The present pasha of Tripoli shot his own brother in cold blood, while he was sitting and conversing with his mother on an ottoman; and two years ago, his second son, Sidi Hamet, who is to succeed to the throne, the eldest being in exile, deliberately drew a pistol and shot his wife, a beautiful Georgian, just after her confinement, for having accused him of infidelity with two of her slaves. The Moors are temperate in their diet, and simple in their dress; but the women of Tunis, Tripoli, and Algiers wear splendid apparel, and deck themselves all over with gold, silver, and ornaments of precious stones. In the towns the Moors are merchants, and in the country the labours of the field are chiefly in their hands. On the borders of the desert, particularly in the Morocco dominions, they are found in considerable numbers, living, like the Arabs, in tents, and subsisting on dates, millet, and Indian corn, in the most frugal and abstemious manner. Here they practise the art of weaving, and of preparing what is known by us as Morocco leather. They dye skins and cotton cloth of different colours; they manufacture swords, and decorate their scabbards with plates of gold and silver; make stirrups and bridle-bits of single pieces of metal; work gold rings, chains, bracelets, and all other decorative ornaments, with great taste and skill; and are, in short, an ingenious people.

Arabs. The Arabs are spread over every known part of Africa, and are just now in possession of the finest portions of Soudan. Mounted on their camels, or the swifter species of dromedary called *moherey*, they fly across the desert, and have planted the standard of their prophet from the shores of the Red Sea to Cape Negro, and from the Senegal to Sofala. "The conquest of Africa," says Gibbon, "from the Nile to the Atlantic Ocean, was first attempted by the arms of the Caliph Othman. The pious design was approved by the companions of Mahomet and the chiefs of the tribes; and 20,000 Arabs marched from Medina with the gifts and the blessing of the commander of the faithful." This event took place in the year of Christ 647. These conquests, however, were suspended, and about forty years afterwards the complete subjugation of this unfortunate country was reserved for Ackbah, whose career, as we are told, but not his zeal, was checked by the prospect of a boundless ocean. "He spurred his horse," says the Roman historian, "into the waves, and raising his eyes to heaven, exclaimed, with the voice of a fanatic, 'Great God! if my course were not stopped by this sea, I would still go on to the unknown kingdoms of the west, preaching the unity of thy holy name, and putting to the sword the rebellious nations who worship any other gods than thee.'" Gibbon had no dislike to an oriental hyperbole, and the one just quoted is made up from two French interpreters of Novairè's *Encyclopædia*. The Greek colonists were expelled the country, but it was some time before the Moors consented to receive the laws, the religion, and the language of the Arabs. It is the custom to speak of the conquest of Spain by the Moors; but the motley crew which passed the strait, from Ceuta and Tangier, consisted of a far greater proportion of Arabs than of Moors.

The true unmixed Arabs, or those who call themselves Shirifs, the descendants of the family of Mahomet, are easily distinguished from the Bedouins and the numerous tribes who have freely mingled with the people among whom they have planted themselves. The true Arab has a more lively and expressive physiognomy; a complexion more approaching to the olive colour; a small, dark, sparkling eye, deeply sunk in the head; an angular face; a short pointed beard; hair strong and black; a mouth but half-closed, discovering his teeth; and a form of body more adapted for agility than strength. Those who dwell near the towns are cultivators of the soil, but the greater number lead a wandering pastoral life; and though capable of the greatest exertion, and patient of hunger and fatigue, they are nearly as fond of an indolent inactive life as the negroes. The Arab women are almost universally ill-featured, and when a little advanced in years are horribly ugly; notwithstanding which they exercise a considerable degree of influence over the men.

Turks.

It might have been supposed that the Moors and Arabs, who had driven the Greek and Roman colonists out of Africa, and who had succeeded in conquering Spain, when driven back out of the latter, would have been able to maintain their government in the former country; but this unfortunate portion of Africa was doomed to endure the more galling yoke of Turkish ferocity, nurtured by fanaticism and ignorance. A handful of Turkish adventurers succeeded in establishing their dominion on the Barbary coast, and, by the payment of an annual tribute to the Ottoman Porte, have ever since continued their barbarous rule, by means of a few Turkish troops, over the more docile and industrious Moors and Arabs. The Turks are an ignorant, bigoted, and indolent race. They will lounge whole days, lying at full length on the flat roofs of their houses, or on the ground in the public places, or in frequenting the baths, or smoking opium and drinking coffee in the houses where these ingredients are sold; but they are very rarely found to submit to any kind of labour. In Africa, indeed, they are almost exclusively employed in the military service. The most enlightened Turkish ruler in Africa is Mahomed Ali Pasha of Egypt, but he has yet done as little as any of the rest to meliorate the condition of his subjects. Aiming at independence, since the fatal blow recently given to the Ottoman dominion, and being free from the fanaticism of Islam, there is some hope, by the ardour with which he is adopting European arts and habits, that he may live to regenerate the fertile country over which he presides.

Copts.

The Copts are very generally supposed to be the descendants of the ancient Egyptians, mingled with the Persians who are said to have been left by Cambyses, and with the Greeks carried thither by Alexander and the Ptolemies, the Romans under the eastern empire, and most probably with the Arabs, more particularly those who inhabit Upper Egypt and Nubia. Their complexion is somewhat darker than that of the Arabs, their foreheads flat, and their hair partakes rather of a soft and woolly character; their noses are short, but not flat; mouths wide, and lips thick; the eyes are large, and bent upwards in an angle like those of the Mongols; and their cheek-bones also are high, and their beards thin; and Denon says there is no grace or symmetry in their shape, and that their bandy-legs and long flat toes are ill adapted for agility. Their original language, which they have still preserved, is a relic of the ancient Egyptian, mixed with some Arabic and Greek words. The Coptic alphabet, though evidently modelled on the Greek, contains some characters belonging to the ancient writing of the Egyptians; and the knowledge of this language has greatly facilitated the alphabet, which Champollon by years of application has extended a little, and but a little, beyond the attempts originally instituted by De Sacy and Dr Young, and of which he has availed himself, without the decency of acknowledging the obligation, as he ought to have done. The Copts are Christians, and addicted to trade and business; a habitude which affords them generally employment under the ignorant and indolent Turks.

Nubians.

The Nubians are a mixed race between Arabs and Ethiopians. The Barabras or Berbers, though somewhat similar to those already mentioned, are supposed to be a different people, or at least to have a greater intermixture with the Arab: their language also is different, as far as the vocabularies have been compared. Like the Arabs, they are so remarkably spare in their persons, as to have apparently almost neither fat nor muscle. Their skin is shining, and in colour not unlike bronze. "Their hollow eyes sparkle under an uncommonly projecting eye-brow; their nostrils are large, the nose sharp; the mouth wide, but the lips thin; the hair of the head and beard is thin, and in small tufts. They become wrinkled at an early age, but are always lively and nimble; they only betray their age by the whiteness of their beards. Their physiognomy is cheerful, and their dispositions lively and good-humoured. They dress in a piece of white or blue woollen cloth; earn very little by their labour, subsist on next to nothing, and are always attached and faithful to their masters." (*Malte-Brun.*) These people are found from Darfoor to Sennaar, and they are described by Burckhardt, at least such of them as dwelt at Berber and Shendi, to be a most debauched and drunken set,—men and women equally immoral and abandoned.

Ababdé Arabs.

The next class of Nubians are the Ababdés, who inhabit the deserts to the east of the Nile. They are Arabs, but differ in customs, language, and dress, from the Arabs in Egypt. They are nearly black, but have Asiatic features; live in tents, use little clothing, possess sheep, horses, and cattle; but what they take most pride in is a species of camel, smaller and more active than the common kind, which they call *aguine*. They are Mahometans. Burckhardt says they have for ages preserved the purity of their race, and will not permit their women to intermarry with the Nubians. "They pride themselves, and justly," says this intelligent traveller, "in the beauty of their girls;" and he describes them as an honest and hospitable people.

The Nubians to the west of the Nile are descendants, in all probability, of the Nubæ or Ethiopians of Ptolemy. They are a gentle kind of negroes, with small features, flat noses, and woolly hair. They are idolaters, and, according to Bruce, worship the new moon. They use circumcision, but feed pigs, and eat pork without any scruple. They are found in this neighbourhood, and the whole way between the Nile and the great desert; and as far down as Bornou are found a great number of different tribes of Arabs, mixed more or less with the original native blacks of Africa, of many of which Burckhardt has given the best account probably that is extant, from his intimate knowledge of the language and history of the Arabians.

Abyssinians.

Abyssinia is the country of the ancient Ethiopians. The inhabitants, however, are, strictly speaking, not black, but their complexion is rather peculiar to themselves, which Mr Bruce compares to the colour of pale ink; or, as may be inferred, a sort of iron-grey. Many, however, are described as of an olive brown, somewhat resembling bronze. And although in their well-shaped forms, their regular features, and their long hair, they approach to the European, there may still be discovered in their features some faint traits of the negro. The Gheez language, in which the books of the Abyssinians are written, is considered to be a dialect of the Arabic; and the Amharic, which is the spoken language, and in use at court, though full of Arabic roots, is of a peculiar construction. It is concluded, therefore, that whatever the original race may have been, it has received a mixture of Arab blood; and the maritime parts, most probably, at some period or other, have been peopled by an Arab colony. They have, however, successfully resisted Islamism; but their Christianity is mixed with some of the Jewish rituals, and admits circumcision in both sexes as a harmless practice. The Troglodytes, who inhabit the country of Habesh, which extends along the Arabian Gulf, or Red Sea, seem to have changed little of the manners and customs ascribed to them by the ancients. The hollows of the rocks were, and still are, their dwellings; they subsist by fishing, and breeding a few sheep and goats; they speak the Gheez language, and are in all probability a branch of the original Abyssinians.

Caffres or Kafirs.

Along the whole range of the eastern coast of Africa, from Cape Guardafui to within 500 miles of the Cape of Good Hope, are a race of people more or less black, generally of a deep bronze colour, large in stature, of a bold and independent gait, of fine forms, and strongly built, having the head shaped like the most perfect of Europeans, the nose a little arched, the lips somewhat thickened, the hair frizzled, but wiry rather than woolly, and, when suffered to grow long, hanging in spiral locks like so many cork-screws. They make use of different dialects of the same language, in all of which may be heard a mixture of Arabic words, more or less as they are nearer to or farther from the Strait of Babelmandib. The Portuguese, when they had first doubled the Cape of Good Hope, and touched at the Arab settlements on the eastern coast, learned from the Mahometan settlers, that these people were called Caffres or Kafirs, by which they meant only that they were infidels. Those tribes nearest to the colony of the Cape still bear the name. It does not appear that they anywhere extend a great way into the interior, as the whole of the many thousand slaves that have lately been carried away from this coast of Africa by the French, the Portuguese, and the Imaum of Moscat, were negroes, the warlike Caffres having successfully repelled every attempt of these infamous traders to reduce them to a state of slavery. The tribe nearest to the Cape colony call themselves Koussie. Beyond them are the Hamboonas, and at Port Natal the Zoolas. Those who inhabit the interior to the north and north-west are the Boshuanas, the Barroloos, and the Wanketzens; and thus, till we reach the Gallas, at the foot of the Abyssinian Mountains, each tribe has its own name, though they are evidently sprung from the same origin, a mixture of Arabs with the native black African. These several tribes subsist almost entirely by their herds of cattle, and a little millet (holcus), and a species of bitter gourd, these being almost the only plants they cultivate, at least to the southward. More northerly, the country, increasing in warmth of climate and fertility, may probably afford them spontaneous products of nutriment. At Port Natal a lieutenant of the English navy has established a little colony, to which these people bring him large quantities of ivory, skins, bees-wax, and some other articles, which he purchases cheap, and sends to the Cape of Good Hope.

Hottentots.

In the southern angle of Africa, and confined within very narrow limits, is a race of men totally distinct from every other tribe of people on that continent, and, in some respects, from every known people in any part of the globe. Where they originally came from, and how they happened to be hemmed in, and confined entirely to this remote corner of the earth, is a problem not likely to be ever satisfactorily solved. The only people to whom the Hottentot has been thought to bear a resemblance, are the Chinese or Malays, or their original stock the Mongols. Like these people, they have the broad forehead, the high cheek-bones, the oblique eye, the thin beard, and the dull yellow tint of complexion, resembling the colour of a dried tobacco leaf; but there is a difference with regard to the hair, which grows in small tufts, harsh, and rather wiry, covering the scalp somewhat like the hard pellets of a shoe-brush. The women, too, have a peculiarity in their physical conformation, which, though occasionally to be met with in other nations, is not universal, as among the Hottentots. Their constitutional "bustles" sometimes grow to three times the size of those artificial stuffings, with which our ladies are now (1829) disfiguring themselves. Even the females of the diminutive Bosjesmen Hottentots, who frequently perish of hunger in the barren mountains, and are reduced to skeletons, have the same protuberances as the Hottentots of the plains. It is not known even whence the name of Hottentot proceeds, as it is none of their own. It has been conjectured that *hot* and *tot* frequently occurring in their singular language, in which the monosyllables are enunciated with a palatic clacking with the tongue, like that of a hen, may have given rise to the name, and that the early Dutch settlers named them *hot-en-tot*. They call themselves *qui-qua*, pronounced with a clack. They are a lively, cheerful, good-humoured people, and by no means wanting in talent; but they have met with nothing but harsh treatment since their first connection with Europeans. Neither Bartholomew Diaz, who first discovered, nor Vasco de Gama, who first doubled, the Cape of Good Hope, nor any of the subsequent Portuguese navigators, down to 1509, had much communication with the natives of this southern angle of Africa; but in the year above mentioned, Francisco d'Almeyda, viceroy of India, having landed, on his return, at Saldanha (now Table) Bay, was killed, with about twenty of his people, in a scuffle with the natives. To avenge his death, a Portuguese captain, about three years afterwards, is said to have landed a piece of ordnance loaded with grape shot, as a pretended present to the Hottentots. Two ropes were attached to this fatal engine; the Hottentots poured down in swarms. Men, women, and children flocked round the deadly machine, as the Trojans did round the wooden horse, "*funemque manu contingere gaudent.*" The brutal Portuguese fired off the piece, and viewed with savage delight the mangled carcasses of the deluded people. The Dutch effected their ruin by gratifying their propensity for brandy and tobacco, at the expense of their herds of cattle, on which they subsisted. Under the British sway they have received protection, and shown themselves not unworthy of it. They now possess property, and enjoy it in security. One of the most beautiful villages, and the neatest and best cultivated gardens, belong to a large community of Hottentots, under the instruction and guidance of a few Moravian missionaries.

Quadrupeds.

Africa possesses in abundance all the larger kinds of quadrupeds that are found on other continents, with many that are peculiar to itself; as, for instance, the giraffe or camelopardalis, the hippopotamus, the zebra, the quacha, the gnoo, and some other species of the antelope tribe, of the last of which there are about twenty, and the two-horned rhinoceros, of which there are at least two varieties. Of the minor quadrupeds, there are also many species unknown to other countries, and many yet, no doubt, remain to be discovered. The ancients had a strange notion, from the extraordinary nature of the camelopardalis, the ostrich, and some others, that newly-created species were constantly springing up in Africa, which is thus accounted for by Pliny: "*Africa hæc maxime spectat, inopia aquarum ad paucos amnes congregantibus se feris. Ideo multiformes ibi animalium partus, varie fœminis cujusque generis mares aut vi aut voluptate miscente. Unde etiam vulgare Græciæ dictum—semper aliquid novi Africam afferre.*" A brief notice of some of the more remarkable animals will suffice, in the general view we are now taking of the continent of Africa.

The Giraffe.

That extraordinary animal, named the camelopardalis or giraffe, is found in all the dry regions of Africa, between the sources of the Senegal and Dongola; but it is doubtful whether it is ever met with in the rich soil of Soudan. There is reason to believe, however, that it is common in most parts of South Africa, as far down as the Orange River, along the northern banks of which they are found in great numbers; but none has been known to cross this river. For a long time the existence of such an animal was considered to be doubtful, though various writers have mentioned their being exhibited at Rome; but it is now familiar enough, particularly since the pasha of Tripoli sent over two living species, one for his Majesty, and the other for the king of France. In its native country it browses on trees, particularly on a species of mimosa; but when domesticated, which it soon becomes, it will eat any kind of vegetable food. On the passage of the two in question from Tripoli, they were fed chiefly on cow's milk. They are mild and inoffensive animals.

The Hippopotamus.

This singular and unwieldy animal, we believe, is peculiar to Africa, in almost all the large rivers of which it is found in considerable numbers, though it has been supposed to exist in the rivers of Sumatra. This is not very probable, as it would not be easily explained how it came into this insulated situation, seeing that it has no existence in India or China, or in any other of the large islands of the Indian Ocean. This amphibious creature seems to derive its chief sustenance from the land, though its dwelling is mostly in the water, from which it never proceeds to any great distance. It browses on the nearest shrubs, and feeds on the reeds of the marshes. "He lieth," we are told in the book of Job, "under the shady trees, in the covert of the reed and fens; the shady trees cover him with their shadow, the willows of the brook compass him about." In their track, which is easily discovered by two deep furrows like the ruts of waggon-wheels, the negroes make a deep pit carefully covered over, into which if he once fall, there is no possibility of his ever getting out. The Caffres and Hottentots, however, say that he has learnt to be too cunning to fall into the trap; and their mode of taking him is to watch by night, and to wound him with their darts or spears in the tendons of the knee-joint, which lames him so much that they easily dispatch him with their numerous hassagais. The little Bosjesmen Hottentots, however, continue to take them in pits. Mr Barrow says, that in the Orange River his party shot no less than four in one day, out of one of which a perfectly formed fœtus was taken, wanting only the teeth and tusks. It was only seven inches long, while the weight of the parent was estimated to be from three to four thousand pounds.

The Zebra.

This curious animal, of the asinine tribe, is singular from having its body striped in every part, from the tip of the nose to the end of the tail; but its head is large, its ears long, and it is without beauty of form in any part of its body. It is difficult, if not impossible to tame it, when taken at full growth, being vicious in the highest degree. An Irishman belonging to a dragoon regiment persisted in mounting a half-tamed female zebra belonging to the Landrost of Zwellendam. She kicked, plunged, and threw herself down, to no purpose; the man kept his seat. She then threw herself from a high bank into a hole in the river; the dragoon was thrown, but still kept hold of the bridle, and she dragged him to the shore, when turning quickly round, and putting her head close to his face, she completely bit off his ear.

The Quacha.

This animal is also peculiar to Africa, and was long considered as the female zebra. It is, however, a distinct species, less striped, but much more robust, and better shaped, than the zebra, and not difficult to domesticate. A pair of these animals were to be seen not long ago drawing a light carriage in Hyde Park. The late Lord Morton had a stallion that covered an Arabian mare, which produced a handsome horse, partaking much of the form, and having the stripes of the quacha. But the most remarkable circumstance is, that the same mare afterwards produced two foals in succession, on which the stripes were very visible, though she had been removed from the quacha to another part of the country, and had never seen him but at the time above alluded to. This fact has been attested by Sir Everard Home, who examined the two foals.

The Gnoo.

This animal, of the antelope genus, for so it has been classified by naturalists, is a most extraordinary creature. It has been described as partaking in its form of the horse, the ox, the stag, and the antelope; the shoulders, body, thighs, and mane, being equine; the head completely bovine; the tail partly of the one and partly of the other, exactly resembling that of the quacha; the legs and feet slender and elegant like those of the stag; and lastly, it has the *subocular sinus*, which is supposed to be the distinguishing characteristic of the antelope tribe. In the *Systema Naturæ* of Linnæus, it is described, by Sparrman, among the antelopes, and mentioned also a second time as a variety of the *bos Caffer*, under the description of *elegans et parvus Africanus bos*. It is so fierce, and so full of gambols, that the Dutch boors of the Cape have named it the *wilde beest*. It possesses in an eminent degree strength, swiftness, a nice nose, and a quick sight. Its motions are free, varied, and always elegant: whole herds of them are seen together in the plains bordering the Orange River. Truter and Somerville procured in the Boshuana country a much larger species called the kokoon, having a long flowing black mane, not erect and trimmed, as it appears to be in the common gnoo.

The Rhinoceros.

The common two-horned rhinoceros of Africa is altogether different from that of India in its figure and character. The skin may be called smooth when compared with the folds that are so remarkable in the Indian species, which is covered as it were with a hide of mail. The eyes are very low in the head, almost at the root of the nose, and close under the upper horn, and so minute, that one would be apt to conclude them of little use to so enormous an animal; but by being placed in a sort of projecting socket, nature has compensated this apparent want by giving them a greater range, allowing them, without moving the head, to sweep round a portion of the horizon equal perhaps to 260 degrees. The variety found near the mouth of the Orange River is called the white rhinoceros, being much larger than the other, having its hide remarkably thin, and of a pale carnation colour, all of which, however, may be the effects of age. Another variety was met with at a considerable distance to the north-east of the Cape colony by the missionary Campbell, having the longer horn almost perfectly straight and of an unusual length, while the lesser one was smaller in proportion. And Truter and Somerville, in the Boshuana country, met with a very large species, with the two horns nearly of the same length, which the natives called the *jeckloo*. This large animal, of one species or another, is found in all the woods of Africa, from Soudan to the Cape of Good Hope.

The Oreas or Eland.

Of this family of animals Africa contains more species than are to be found in all the rest of the world, and of all sizes, from the large oreas, which the Dutch call eland, to the small pigmy antelope; but then Africa is supposed not to possess a single species of the *Cervus* or deer tribe in a state of nature. The oreas is the finest species of this numerous genus; it has a large dewlap, and other characteristics of the bovine genus. The male has been known to measure the enormous length of ten feet and a half, by six feet and a half in height. The flesh resembles that of beef, on which account the boors hunt them, and salt the flesh for winter provision; and so easily are these animals overtaken, that in all probability the eland has ere this disappeared from the colony.

The Bubalus or Haslebeest.

This is another large species, also partaking of the ox, and hunted down for the sake of its carcass. Like the former, this is also a mild and patient animal; its size about seven feet long by five high. Like the eland, too, it is a gregarious animal; but being easily hunted down, both species will probably disappear altogether.

The Strepsiceros or Koodo.

This is a noble animal, but somewhat inferior in size to the *bubalus*. It is the *striped antelope* of Pennant, and is remarkable for its long spiral horns, which are commonly to be met with in almost every museum of natural history. A black mane adorns the neck of the male, and along the spine is a ridge of white hairs. The female has none of these, nor any horns.

The Pygargus or Spring-bok.

This is one of the most elegant, and by far the most numerous, of all the species of antelope that frequent Southern Africa. They have been known to assemble in herds of thousands, particularly when about to migrate towards the north. The leaps that this creature is enabled to take are quite astonishing, being from fifteen to twenty-five feet. No dog is able to approach them, except when jammed together like a flock of sheep, which sometimes happens in making their way through a narrow pass. The other antelope species that are met with in the colony of the Cape, are (taken in the order of their size), the gems-bok; (*A. Oryx* of Syst. Nat. and *Pasan* of Buffon); the blau-bok (*A. Leucophæa*); bonté-bok (*A. Scripta*); the steen-bok; the bosch-bok; the klip-springer; the greis-bok; the duyker; the reit-bok; the *Orabie;* and the *Pygmæa*, the smallest perhaps of hoofed quadrupeds, with the exception of the little Indian musk-deer. Many other species of this extensive genus are no doubt to be found in other parts of Africa. Two new ones were seen by Messrs Truter and Daniell in the Boshuana country, the one named the palla, resembling the spring-bok in shape and horns, but larger; and the tak-heizé, or wild creature, so named from its ferocity, though apparently partaking of the cow and the antelope. Two or three others, apparently new, were also seen by Denham and Clapperton in Soudan. The numbers that formerly frequented the Cape have considerably diminished since the formation of the new settlements to the eastward: even previously to this, where the Caffres had possession of the plains of the Zeure-feld, their mode of hunting was not only most destructive to the several kinds of game, but calculated to drive them away beyond the limits of the colony. A party, consisting of several hundreds, men, women, and children, formed a circle round the plain on which they discovered a herd of antelopes: they then marched towards the centre, narrowing the diameter till the objects of their pursuit were completely fenced in. The antelope tribe, more particularly the spring-bok, follow their leaders like sheep. An opening is made in the circle, through which all endeavour to rush, and while impeding each other, the men with their hassagais get in among them and make a dreadful slaughter.

The Elephant.

This huge animal is found in all the wooded parts of Africa, from the southern boundary of the great desert, to the Cape of Good Hope, on the eastern coast of which they are still very numerous. Gigantic as it is, the elephant is a harmless animal in comparison with the lion, the leopard, wolves, and hyenas; but if irritated, he never fails to seek revenge. The Caffres and the Negroes usually take them in pits, at the bottom of which are fixed sharp stakes. The African elephant is of a less size than those of India, Pegu, Siam, Cochin-China, and Ceylon, rarely averaging more than nine feet; whereas in the countries above mentioned they attain the height of eleven feet. Dr Lichtenstein was assured by experienced hunters, and he was silly enough to believe them, that in the forests of Tsitsikamma, in Southern Africa, there are elephants *eighteen feet* high, that run in troops of 500 together. Major Denham also says, that on the margin of the lake Tsad may sometimes be seen elephants of *sixteen feet* high, in troops of 400. It does not appear, however, that he ever had any opportunity of measuring one, otherwise he would have corrected his mistake as to size.

The Buffalo.

This animal is the *bos Caffer* of the *Systema Naturæ*, and is probably the most fierce and powerful of the bovine tribe. Its height is about that of a common-sized ox, but it is nearly twice its bulk. Its horns are twelve or thirteen inches broad at the base, separated only by a narrow channel, which fills up with age, and gives to the animal a forehead of solid horn, hard as rock. The lion is said sometimes to measure his strength with the buffalo, but his attack is, as usual, by stratagem. Couching till his prey is within his reach, he springs upon his back, fixes his fangs in his throat, strikes his paw in his face, and pins him by the horns down to the ground.

The Lion.

The African lion is the noblest animal of his race. None of the Asiatic lions are to be compared with him for size, strength, or beauty. Indeed it is a remarkable fact, that all the animals in Africa are superior to those of the same species in other countries, with the exception perhaps of the elephant, which, as we have said, is much smaller than those of India, Siam, and Cochin-China, and also of Ceylon. The habits of the lion differ little from those of the rest of the feline tribe. He seldom attacks openly, and not at all except when pressed by hunger. Much of his life is supposed to be passed in sleep, from which he is roused only by hunger. He then watches in ambush till an opportunity offers for pouncing on his prey; but if nothing present itself near his den, he walks out leisurely; and in the exact manner of a cat when she advances towards a mouse or bird, does the kingly monster approach a flock of antelopes or sheep, till he may be able to pounce upon his victim. The Hottentots say, and the Dutch boors of the Cape confirm it, that if a lion should get near a flock of sheep guarded by one of these people, he will invariably prefer the biped to the quadruped, and in doing so he shows his judgment; for, to uncase a sheep of its woolly covering would require some labour, which his indolent habits prompt him to avoid. The naked Hottentot requires no preparation; besides which, he is generally well basted with grease. The lion is found in every part of Africa.

The striped Bengal tiger is peculiar to India and some other parts of Asia; but in Africa there are various species of the tiger family, less powerful, but not less ferocious than that of Bengal. Leopards are numerous and very fierce; and a smaller kind, known as the tiger-cat, not less so; and all of them, if hard pressed, will turn round and spring upon their pursuers.

The Dog. The native dogs are of two kinds, one large, resembling the common wolf, and another small, not unlike the fox or common jackal. There are besides two species of ravenous wolves, which commit great depredations among the cattle; two species of jackal; and two of hyenas, one striped, the other a dark brown colour. These disgusting animals, in the early periods of the Cape settlements, were numerous in the caves of the Table Mountain, and used to prowl the streets of the town at night. Kolbe relates a story of a drunken trumpeter, while asleep in the street, being seized and dragged along by one of these powerful animals. The man awaking, and without exactly knowing what was going on, got his trumpet to his mouth and blew a blast, which so terrified the ravenous beast, that he immediately let loose his prey, and ran off at full speed.

Other quadrupeds. That curious animal, the sus Ethiopica, is found in all the woods, whose hooked tusks, curved upwards, have puzzled philosophers so much in endeavouring to explain their utility: they are certainly not intended, as an ingenious Frenchman suggested, to hang up the animal's head on a branch while it sleeps. The earth hog of the Dutch is the myrmecophaga, or ant-eater. The *hystrix cristata*, or crested porcupine, is also common; and almost every species of the genus *viverra* is abundantly found in all parts of Africa. Baboons and monkeys of all sizes and varieties are most abundant in the woods of the tropical regions; but the *cynocephalus*, or black baboon, is almost the only one that frequents the more temperate climates. Lizards abound in all the sandy deserts, and two or three species of the cameleon; and the crocodile or alligator is found in all the larger rivers, to the great terror of the negroes. In fact, they are as dangerous to man when in the water as the sharks are. The singular attack made by one of these animals on Isaaco, who accompanied Mungo Park, would not be credited on less authority than that of the unfortunate traveller himself.

Insects and reptiles. It is almost unnecessary to observe, that in such a climate as Africa, noxious insects and reptiles of almost every kind abound: scorpions, scolopendras, enormous spiders, snakes, and other venomous creatures. But the Africans suffer less from any of these than from two other objects, which, though individually harmless, are, when in swarms, the greatest scourge that can be inflicted on a country.

Termites or White Ants. These are the *termites* or white ants, and the *grylli* or locusta. These ants, small as they are, construct their habitations of clay of an enormous size. Clapperton met with some of these in his last journey, rising to the height of ten or twelve feet, and having the appearance of so many gothic cathedrals in miniature. In the extra-tropical parts they rarely exceed four or five feet. This destructive creature devours every thing in the shape of wood, leather, cloth, &c. that falls in its way; and they march together in such swarms, that the devastation they commit is almost incredible. One of the Portuguese missionaries to Congo relates, that an army of these insects not only drove him out of his house, but ate the whole of it except the walls; and another says, that having tied up a cow in an outhouse, he found in the morning nothing left of the animal but the skeleton. Stories equally wonderful are told of this pernicious insect in India.

Grylli or Locusts. The locusts are still more destructive, for they sometimes lay waste a whole country. They are gregarious, and whenever an army of these insects is on its march, not a blade of grass or leaf of tree or shrub escapes their voracious appetite; and the tract of country over which they have passed appears as if it had been swept with a broom. In a few hours a whole field of corn is totally consumed. No remedy has yet been discovered to stay this afflicting scourge. The smoke of green wood seems to annoy them; but if they rise from one place, it is only to alight again in the immediate vicinity. It has been stated by various travellers of undoubted veracity, that, when on the wing, they form so numerous and dense a phalanx, as to obscure the face of the sun like a black cloud.

Birds. Africa contains the hugest of birds, the ostrich, as well as the largest of quadrupeds; and it has specimens of the feathered race of all gradations of size, and brilliant plumage, down to the beautiful little *certhia* or creeper. The condor vulture is not uncommon; the percnopterus or Egyptian vulture, and the sociable vulture, are most abundant; and all that Pliny has related of this bird, as to its sagacity in discovering dead carcasses, seems to be perfectly correct. We are told, that if an animal should die in the very midst of the dreary desert, in the course of a few minutes there will be seen, high in the zenith, a number of minute objects descending in regular gyrations, and increasing in size at every revolution, and these on their approach to the earth are discovered to be vultures. Thus descending even in the presence of man, they will at once pounce on the prey, which they devour with such greediness as frequently to be unable to rise from the ground. The *serpentarius*, or snake-eater, called by the Dutch the *secretary* bird (from some quill-feathers growing out of the head), is the declared enemy of snakes, which it attacks wherever they are met with, and feeds its young with them. Eagles, kites, and crows are abundant; and guinea fowls, bustards of an enormous size, grouse, partridges, and quails, much more so. The Numidian, the virgin, and Balearic cranes, the rose-coloured flamingo, the solitary pelican, and a great variety of water-fowl, frequent the lakes and rivers of every part of Africa except the sandy desert. In the equinoctial regions are parrots and paroquets innumerable, and birds of the most beautiful plumage, but without those sweet notes with which our more modestly clothed warblers are gifted. Nothing can exceed in elegance and brilliancy, on a sunny day, the numerous tribes of certhias, which, perched on the petals of the vase-shaped corollas of the protea mellifera, may be seen in great numbers, sipping out the honey with their long scimitar-shaped beaks.

Fishes. It is almost unnecessary to say, that on both coasts of Africa, within the tropics, sharks are most abundant. Whole shoals of them may be seen in the Bight of Benin and that neighbourhood, following the slave ships in particular, from which no day occurs without some unfortunate victim being launched overboard. On the southern coasts, on both sides of the continent, both the black and spermaceti whales are plentiful. The edible fish are various, and some of them, of the perch genus in particular, are very good.

Distribution of Africans, &c. Having thus taken a very general view of the face of the country, its productions and varied inhabitants, the next step will be to give a brief account of their particular distribution and condition, state of society, habits of industry, and other particulars, as far as our limits will allow; commencing with Egypt and Abyssinia, continuing down the eastern coast to the Cape of Good Hope, thence to the Straits of Gibraltar, and returning along the Mediterranean to the Isthmus of Suez, whence we set out: after this to take a condensed view of the interior of Northern

Africa, as far as the late geographical discoveries will with certainty admit.

Egypt.

The government of Egypt, under its present ruler Mahomed Ali, is unquestionably the most civilized of any in Northern Africa. Perhaps also it is the most populous, and, with its late conquests, embraces a larger extent of territory, comprehending Nubia, Dongola, Sennaar, and, nominally at least, Cordofan, and Darfoor.

The pasha nominally holds under the Ottoman Porte; and his confidential officers, and those of the army, were mostly Turks, until the late unfortunate campaign with Russia, since which he is said to have discharged every Turk from his army. There are however many Arabs, particularly in the upper parts of Egypt, and in the deserts on each side of the Nile. The Copts are mostly in Lower Egypt, and are many of them employed as writers and factors. The great mass of the population are the fellahs or cultivators of the land, a mixed race of Moors, Arabs, Copts, and Negroes. The chief city is Cairo, which has often been described, and the principal port Alexandria. It is said, that from 20,000 to 40,000 pilgrims, from the Barbary States and other parts of Africa, on their way to Mecca, used annually to pitch their tents under the walls of Cairo, where they were supplied with provisions for their future journey, on which the pasha took care to levy a contribution; but there is reason to suppose that these pilgrimages have received their deathblow by the late events.

From Cairo, the two chains of hills which bound the valley of the Nile begin to diverge, the one turning east to Suez, the other north-west to the Mediterranean. The valley they inclose is the delta of the seven-mouthed Nile, all now closed up except two; the one emptying itself into the Mediterranean at Rosetta, the other at Damietta. This great triangular plain owes its fertility to the annual overflowing of the Nile, which is of so extraordinary a nature, that without manure or lying fallow, it has continued to yield an annual crop for several thousand years. The mud which the Nile deposits, on being analyzed by the French, was found to contain nearly one-half of pure argillaceous earth, about one-fourth of carbonate of lime, the remaining fourth carbonate of magnesia, oxide of iron, and water. All kinds of grain and vegetables grow on the delta with the greatest luxuriance. Cotton, flax, indigo, carthemum, tobacco, beans in great variety, and cucurbitaceous vegetables, are the most common products of Lower Egypt. In Upper Egypt, Nubia, Dongola, and Sennaar, the dourrha (holcus) is the common food of the people. The date-palm is seen in groves of thousands together, and gives a striking character to the country. Citrons, lemons, oranges, pomegranates, bananas, figs, the carob, jujube, and olives, and the laurus Persia, are abundant. The cassia fistula and the mulberry are also common. The few trees not of much use are chiefly confined to accacias or mimosas, sycamores and willows.

They have plenty of good horses; those from Dongola being of an excellent breed. They have also fine asses and mules, camels and buffaloes, sheep and goats. Poultry is abundant; and the factitious incubation of eggs, by means of artificial heat, is still practised. The Nile is not much celebrated for esculent fish; and the huge hippopotamus and the crocodile are almost entirely banished from Egypt, particularly the former. The ibis, held sacred by the ancient Egyptians, is a species of curlew still extant; and the percnopterus vulture still acts as the scavenger of the towns and villages.

The invasion by the French destroyed what little trade the port of Alexandria then possessed, which it has not yet recovered, though it is on the increase. Most travellers agree in the melancholy feelings, excited by the forlorn and neglected state of this once magnificent city, which abounded in temples, palaces, baths, and theatres, and which is said to have reckoned 300,000 freemen among its population, when it first fell under the dominion of the Romans. On Mahomed Ali's accession to the government, not more than about 100 vessels frequented the port: they are now at least 1000. The population may be reckoned about 20,000. Rosetta is a dark and dismal city, the upper parts of whose houses, like those in the old towns on the continent of Europe, overhang the ground stories, and almost meet at top; but it is surrounded with date-trees, bananas, and sycamores. Damietta is surrounded by a swamp or morass, which is noted for the excellence of its rice. It is a dirty town, with a considerable population, among whom fevers, agues, and blindness, are the predominant diseases. The former of these cities contains about 20,000 inhabitants, and the latter about 40,000. The total population of Egypt, exclusive of the wandering Arab tribes, is reckoned at about 2,000,000; and these pastoral tribes may perhaps amount to about half a million more. The Greek war, in which the pasha was compelled to take a part, and the annual tribute he has been obliged to pay to the Ottoman Porte, have greatly embarrassed his finances. Before the battle of Navarin, he is said to have had 50 sail of ships of war, great and small, and from 30,000 to 40,000 regular troops. To recruit these, both the agriculturists and the merchants, chiefly Jews and Armenians, have been greatly oppressed by new and excessive contributions.

The condition of all classes of the population, but more especially of the agriculturists, is as miserable as can well be imagined. It would appear indeed to have undergone no change for the better since the days of the Pharaohs; and in later times, whether under the yoke of the Persians, the Greeks, Romans, Arabians, Turks, Mamelukes, or French, this unfortunate country, as Niebuhr has justly observed, has enjoyed no interval of tranquillity and freedom, but has constantly been oppressed and pillaged by the lieutenants of a distant lord; the sole object of both being that of extorting as large a revenue as possible from the hard hands of the peasants.

In Nubia, the mass of the inhabitants who are named Barabras, or Berebers, or Berbers, are more independent than those below the cataracts of the Nile. They are found in Dongola and Sennaar, and along the western side of the Nile, residing among the Arabs and Negroes, and their mixed offspring, from whom however they are easily distinguished. They are stated to be a frugal, harmless, and honest people, subsisting chiefly on dates, dourrha, and a few leguminous plants. When Mr Legh visited Dehr, which he calls the capital of Nubia, the cachef was drunk. He had 300 armed negroes at his elbow, and at least 3000 in the district. These fellows, as Burckhardt observes, are to be dreaded by travellers; but there is nothing to fear from the Nubians, who are in general free from the vice of pilfering. This intelligent traveller makes a remark which is curious, that the size and figure of the Nubians were generally proportioned to the breadth of their cultivable soil, that is, in other words, to the quantity of food they had to subsist upon. The chief produce is dourrha, of which they make a kind of cake, not unlike the *teff* of the Abyssinians; and they also brew a strong beer or spirit from it, called *booza*, which, it appears, is known under the same name all over Soudan, and in which all classes were observed by Burckhardt to indulge to the greatest excess, as he advanced to the southward, more particularly at Berber and Shendi.

Still farther south is Sennaar, which also submitted a few years ago to the arms of the pasha of Egypt; but the mountaineers to the southward and westward, between the rivers Azrek and Abiad, refused to acknowledge their new master. These mountaineers are described as a fine and handsome race of men, quite black, but with Arab features, which nearly resemble those of the inhabitants of Sennaar. They are called Bokki, and resemble in their dress very much the Indians of South America, being covered almost with beads, bracelets, and trinkets, made of pebbles, bones, and ivory. The men have helmets of iron, coats of mail made of leather, carry long lances, and a weapon resembling the ancient bills used by the yeomanry of England. A musket, which was new to them on the invasion of the Turks, they called a coward's weapon, which destroyed life by an invisible stroke.

An American gentleman, who accompanied the pasha's army, describes the people from Assuan to Sennaar as differing in character and complexion as follows: Those of Succoot are less black than the Nubian and Dongolese; the latter are dirty, idle, and ferocious; those of the third cataract are indolent, but honest and obliging. The Berbers are the most civilized; the people of Shendi and Halfeya are sullen, scowling, crafty, and ferocious; while the peasants of Sennaar are a quiet and respectable people, but very much the reverse in the capital. They resemble, he thinks, the Indians of America in possessing the general characteristics of courage and self-respect.

That long strip of land interjacent between the Nile and the Red Sea, and from the Isthmus of Suez to the Strait of Babelmandib, an extent of 13 degrees of latitude, or 780 geographical miles, is a naked and arid desert of rock and sand, wholly destitute of water. A precipitous chain of mountains bounds the eastern shores of the Nile like an artificial wall; and the boundary next the Red Sea is in most places equally precipitous, affording very few, and these but indifferent, harbours. This country seems to have no particular name, though it is sometimes called Habesh, by some Asiatic Egypt, and by others African Arabia. The latter might be the most proper, as it is chiefly inhabited by a few straggling Ababdé Arabs, with their sheep and goats, and by some mixed Arabs, and Negroes, and Copts, as fishermen on the sea-coast. Bruce calls them Aguzi or Gheez, which means shepherds; and they speak the Gheez language, which is a dialect of the Arabic. It was in this miserable country that the ancients placed the small race of men called the Troglodytes, from their dwellings being the caverns of the rocks; and it was here, too, that the ancients were supposed to have worked the emerald and the topaz mines, and which the present pasha of Egypt employed a Frenchman of the name of Caillaud to explore and work. At Mount Zaborah, seven leagues from the Red Sea, and 45 to the southward of Cosseir, he gives a marvellous account of a mine into which he descended through difficult and winding passages, 400 feet under ground, and brought back a hexahedral prism of emerald. This mountain appears to be the Jebel Zumnid of Bruce, who "saw in four days more granite, porphyry, marble, and jasper, than would build Rome, Athens, Corinth, Syracuse, Memphis, Alexandria, and half a dozen such cities." Belzoni thought these mines, with their pits and shafts, nothing more than stone quarries. The pasha, however, was so pleased with his emerald, that he gave Caillaud 120 camels, and 50 Ababdé Arabs to take care of them, to load with the precious stones; but the whole party, men and beasts, had nearly perished for want of water. He brought back, however, to Cairo several pounds' weight of green stones, which he called emeralds, but which were probably nothing more than beryl or aqua marina, which did not answer the purpose of the pasha, and the search was discontinued. He talks of thousands of excavations, and traced the ruins of a Greek city of stone, 500 houses of which were still standing, in which were lamps, broken vases of earth and glass, and circular stones for grinding corn. The Arabs call it Sekket Bender el Kebyr. It was on this desert also that Ptolemy Philadelphus built the city of Berenice, which afterwards became the emporium of the eastern trade carried on by the Romans, and whose site is supposed to be near the port of Habesh. It was on this arid desert also that the ancient Ascetics, equally ignorant and uncivilized as the savage Troglodytes, had their cells; and it is said that the monasteries of St Anthony and St Paul are still inhabited by Coptic monks, who pretend to have power over the serpents and scorpions, the demons, and the few prowling beasts of prey that infest the country, while they are unable to protect themselves from the depredations of the starving Arabs of the desert. Cosseir, and Suakim, and Massuah, are the principal ports on this barren coast of the Red Sea.

Abyssinia.

The name of Habesh, or the mixed people, is given to the Abyssinians by the Mahometans. Abyssinia is a mountainous country of considerable extent, divided into several kingdoms, or rather provinces, as Tigré, Wagora, Samen, Dembea, Gojam, Amhara, Damota, and some others. Whatever may have been the primitive race of Abyssinia, it is evident, from the two languages of the country, the Gheez and the Amharic, being dialects of the Arabic, that the present inhabitants are a mixed race of Arabs and some other, probably that of the Copts, with a little of native African or negro blood also in their veins. They have a history which goes back to the celebrated queen of Sheba, who travelled to Judea to admire the magnificence of Solomon, and is said to have brought back a living token of the effect which her charms produced on the Jewish king; and that his descendants continued to reign for 960 years after the birth of Christ. In the fourth century, the Christian religion was introduced into Abyssinia, and has continued ever since; but they retain the Jewish rite of circumcision.

The city of Axum, in Tigré, is the ancient residence of the Abyssinian monarchs, who still go thither to be crowned. The obelisk described by the early Portuguese travellers, of a single block of granite, was seen by Salt, who states it to be 80 feet high. There are many ruins of temples, and palaces, and monuments, bearing inscriptions in the Greek, Latin, and Ethiopian languages. This town has now not more than 600 houses, and a few manufactories of parchment and cotton stuffs. Gondar is stated by Bruce to contain 10,000 families and 100 Christian churches. One quarter is inhabited by Moors or Arabs. There is a good market; and the medium of exchange is gold, salt, and cotton cloth.

The natives, whatever they might originally have been, are at present what the Arabs call them, a very mixed race, partaking much of the Arab and the Negro character; and even their language, though confined to this great cluster of mountains, has a very considerable mixture of Arabic roots in it. Their manners are brutal, and their habits filthy. Their houses are mostly circular, and covered with conical-shaped roofs, which is the common form through the central parts of Africa, among the negroes, and down to the colony of the Cape of Good Hope. The children go naked to an advanced age. They are excessively indolent, and all the works of artisans and artificers are in the hands of the Jews. The great lords have the newly-dressed food actually put into their mouths by their servants. They eat raw flesh, quivering almost with life, and placed between cakes of *teff*, made from a species of small millet, or rather grass-seed (Poa Abyssinica); but they do not cut the flesh from the animal while alive, as Bruce has asserted. This is one of those romances, or exaggerated pictures, which brought his whole narrative into discredit; but which, though circumstantially false, is substantially true. The principal alimentary plants of Abyssinia are millet, barley, wheat, maize, and various cucurbitaceous vegetables, and a considerable variety of fruit. Their domestic animals are small horses, buffaloes with long extended horns, cows with bumps between the shoulders, goats, and sheep; besides asses and mules as beasts of burden. Most of the animals already enumerated as natives of Africa, both great and small, are to be found in Abyssinia.

Their southern neighbours, the Gallas and Shangallas, have more of the negro and less of the Arab blood in their veins, and are somewhat less civilized. Beyond them to the southward and westward are the negroes, and to the eastward the Samaulies, who a little farther back in the interior take the name of Caffres.

From the narrow entrance into the Red Sea, or Babelmandib, along the southern coast of the Gulf of Aden, and from thence south by Cape Guardafui to Cape Bashas, in lat. 5. N., the whole territory of both coasts is inhabited by the Samaulies, who are supposed to be a tribe of the same people as the Gallas, mixed, however, with the Arabs, who have from time immemorial occupied the eastern coast of Africa down to Sofala, and whose language is partially incorporated with the native tongue, and traced through all the Samaulie or Caffre tribes, down to the colony of the Cape of Good Hope. The territory above mentioned was known to the ancients under the name of Asania, which is obviously taken from the Arabic name Azine, a descriptive term signifying a rocky, barren, inaccessible coast. The rocky cliffs rise out of the sea to the height of three and four hundred feet, and where they cease, in about 7. 40. N., the coast is sandy, but improves towards the equator. The want of harbours along this coast, the general barrenness of the country, the fierceness of the natives, and probably the difficulty of procuring negroes in this portion of Africa, have prevented any traffic of slaves in this quarter.

From the equator to 10. 50. S., the whole country is extremely fertile, clothed with forests of the finest timber, well watered with numerous fine rivers, and contains many excellent ports. The river Jubo or Jabon, or, as the natives call it, Wooreenda, immediately under the line, is a very fine river, said to have its source in the mountains of Abyssinia. At Raas Boorghal, in lat. 1. 13. S., is port Durnford, having safe anchorage, and a fine river. The bays and harbours of Lamoo, Patta, Quayhoo, but particularly between Lamoo and Mandra Islands, in about the lat. 2. 15. S., afford safe and convenient anchorage. The port of Melinda, in lat. 3. 12. S., though deprived of its former splendour, possesses all the advantages of a good harbour. The pillar erected here by Vasco de Gama is still standing. The island and city of Mombas, placed in the centre of a most magnificent harbour, sufficient to contain the largest fleets, appears to be the central point of Arab commerce on this coast, more particularly in slaves, who are brought down in great numbers by the two fine rivers which fall into the southern and western sides of the harbour. The city is situated in lat. 4. 4. S. In 5. 30. S. is the Quillimané, one of the largest rivers on the east coast. Quiloa or Kulwa Island, like Mombas, is surrounded by a fine harbour, into which flow two large rivers. It is situated in lat. 9. S. There is also a port and river at Querimba, named Lindy, in lat. 9. 59. S.; and in 10. 7. is the great river and port of Monghow or Mongallow. The whole of this country to Cape Delgado, is under the dominion of the imaum of Moscat, who appoints his officers to the several stations on the coast to levy taxes on the natives, and to participate, as he does largely, in the slave-trade. In fact, he is said to demand, as his share of the revenues, one-half, careless how they are raised, or in what manner the people are oppressed. The governor of Mombas, who exercises a sort of control over all the other settlements, was so dissatisfied with the conduct of the imaum, that when Captain Owen called there, he waited on him at the head of 200 chiefs, and at least 2000 of the inhabitants, to entreat that he would accept the country, in the name of the king of England, as a free gift, without any reservation or restriction, and take it under his protection. His Majesty's government, however, did not think it proper to accept the offer of a territory, nominally at least, belonging to the imaum of Moscat.

From Cape Delgado, in about the lat. 10., to De la Goa Bay in lat. 26., the whole extent of coast, though everywhere inhabited by Arabs, and Samaulies or Caffres, is nominally belonging to the Portuguese, or the half-casts of that people, who are held in great contempt by the Arabs, some of whom told Captain Owen that they could at any time drive them away from every part of the coast, even their head-quarters, on the small island of Mozambique, if it were not for fear of drawing upon them the hostility of the English, under whose protection these Portuguese represent themselves to be. This settlement, which once bore some appearance of prosperity, while suffered to carry on an uninterrupted trade in slaves, is now reduced to a very contemptible state. The population consists of about 500 half-cast Portuguese, a mixed race of Arabs and Caffres, and an equal number of negro slaves, the whole not amounting to 3000 souls. The situation for trade is admirable, and behind it is a fine deep bay, with rivers that communicate with the interior, from whence they still clandestinely procure slaves, a small quantity of gold dust, ivory, bees-wax, rice and other grain, fruits and vegetables.

In the district of Sofala is also a fine river, named Quillimané, or Great Water, which preserves its width of more than a mile up to the town, situated at the distance of twelve miles from its mouth, which, however, has a bar across it. Near the town it divides into two other branches, forming an extensive delta; and at Senné, it is formed by the union of two large rivers, the Jambezé from the south-west, and the Suaba from the north-west. To explore these rivers, Captain Owen sent Lieutenant Brown, Mr Forbes, a botanist, Assistant-surgeon Kilpatrick, an interpreter, and three servants, accompanied by a Portuguese serjeant. They arrived at Senné all well; but after this the only account received of them was, that they had all died. Senné is about 250 miles from the mouth of the river, and another settlement called Teté, 150 miles farther in the interior. About a hundred miles farther west are the silver mines of Chicova; and on the Suaba, the other branch of the Quillimané, are Monica and Zamba, where it is supposed the gold mines are situated. Neither the one nor the other, however, is productive; and the probability is, that the small quantity of gold brought down to Mozambique is collected by the natives from washing the sand and the alluvial soil of the rivers.

Sofala itself is a miserable village, having a governor who is a petty trafficker, with a small fort defended by about 60 soldiers, half black and half Portuguese; the inhabitants a mixture of Arabs, Moors, Portuguese, and Negroes; the country fertile, producing rice, pulse, palms, mangoes, bananas, pine-apples, and numerous other fruits.

The river has a bar across its mouth, which is also the case with the fine river Inhambané, in lat. 23. 45. S. The whole of the coast of this district is intersected with rivers and bays, and fenced in, as it were, with numerous fertile islands, remarkable for the number of large trees of the cassuarina genus. The continent is here thickly covered with wood, and the native inhabitants appear to be sparingly scattered along the coast.

The kingdom of Monomotapa, of whose queen we have heard nearly as much as of the queen of Sheba, is at the distance inland of about 40 days journey from Sofala. The natives are clothed in goat-skins, and subsist chiefly on rice and millet, manioc and sweet potatoes. Their weapons are bows and arrows. A small quantity of gold, topazes, and rubies, are brought down to Sofala, in exchange for such luxuries as the governor, the chief trader, may have to dispose of.

De la Goa Bay, where the Portuguese establishments, if they can be so called, end, in about the 26th parallel of latitude, has the two rivers Mafooma or English River falling into it from the west, and Mapoota from the south. A black Portuguese serjeant, or corporal, with a handful of men of the same colour, commands a miserable fort in this fine bay.

From hence to the Great Fish River, in lat. 33½. S., where the colony of the Cape of Good Hope commences, the sea-coast is inhabited by the Hamboonas, the Mambookis, the Tambookis, the Zoolas, and the Koussie, or Makousie, adjoining the Cape, all of whom are of the same race of people as those farther north; Caffres or Samaulies, or by whatever name they may be called—a mixed breed of Arabs and Negroes. The Zoolas, who are stationed along the coast of Natal, having driven down their next neighbours to the borders of the Cape colony, and alarmed its nearest residents, the Caffres, about 500 English troops were sent into the country of the latter to drive them back. They resisted, and a battle ensued. About ten thousand of them, armed with spears, and covered with shields of leather, stood the fire of musketry, which seemed to make but little impression. Our troops then charged them with the bayonet, and some accounts state that more than a thousand were left dead on the field before they gave way, while the cowardly Caffres, on whose behalf they were thus attacked, looked on, or rather began to massacre the women and children, and to plunder them of their cattle, which, however, was speedily put a stop to by the English forces. In fact, the cattle form the chief support of these roving tribes, who on moving them from place to place in search of food, encroach upon some other tribe, and hostilities ensue, which, with occasional famines, keep down the population to the level of subsistence. A little millet (holcus sorghum), and a sort of tasteless water-melon, and a bitter gourd, are the only vegetables they attempt to cultivate.

It is not known how far the Caffre race extend into the interior, but, from the number of negroes that are brought to every part of the coast, from the equator to Mozambique, and part of Sofala, it may be concluded that they extend to no very great distance; nor is there any good authority for the great chain of mountains, which are called Lapoota or the Spine of the Earth, as laid down on the maps. It would seem, however, from the accounts drawn from some negro children brought down to Mozambique, that there must be high land in the interior, as they spoke of hunting the boar in the cold season, when "they can walk on the water."

Cape of Good Hope.

The colony of the Cape of Good Hope extends on the east to the Great Fish River, and on the north to the Gariep or Orange River, which empties itself into the Southern Atlantic in lat. 28. 50. S. While in the hands of the Dutch, this colony was little more than an intermediate convenient station between Holland and its Indian possessions, from which it received tea, nankeens, muslins, spices, and other articles, in exchange for wheat and wine, which were raised chiefly by the labour of negro slaves; even the boors or farmers in the interior, who were of the laziest description of men, cultivating only what was barely sufficient for their own families, and employing Hottentots to tend their cattle. The population of Europeans was very limited, and all in good circumstances. Since it has become an English settlement, the population is supposed to have nearly doubled, and the slaves diminished more than one-half; and in the course of a few years they will probably disappear altogether. The colony, however, can never become of much value in an agricultural point of view, owing to the very great proportion of waste land, unfit either for culture or pasturage, which is at least two-thirds of the whole. The frequent visitations of drought, rust, and locusts, make the crops of grain very uncertain, and numbers of cattle perish for want of food. The great value of this colony to England is its position as a half-way house to India, where troops required for the latter country become well-seasoned, and on an emergency can speedily be forwarded thither, as has been done on several occasions. As a general emporium of commerce, there is not perhaps a spot on the globe more favourably situated; but the East India Company have strong objections to its being made a free-port, or even to its receiving any India and China produce for the consumption of the natives, but such as may be carried thither in their own vessels.

The exportable products of the Cape are, wine, dried fruits, hides, salted meat, ostrich feathers, leopard skins, a small quantity of ivory, whale-oil, wax, and a few other trifling articles, for which they receive clothing, furniture, and other manufactures from England. Almost every species of animal, already enumerated as belonging to Africa in general, is to be found within the limits of the colony; and nothing can exceed the beauty of the vegetable part of the creation, as our conservatories can testify. About 300 species of heath are supposed to be scattered over the colony; those of protea are numerous, beautiful, and magnificent; the bulbous-rooted plants are inexhaustible; and those of a succulent nature, such as euphorbia, crassula, aloe, and cotelydon, in great variety and grandeur. Forest trees, however, are scarce, except along the sea-coast, and accacias or mimosas along the banks of some permanent or occasional stream. Oaks, chesnuts, and other European trees grow well in the valleys, whereever they have been planted; and the fruit-trees of Europe, with the exception of those of the apple and cherry, all do well; and figs, pomegranates, oranges, lemons, and limes, are everywhere met with in great abundance in this fine and healthful climate.

Western coast from the Cape to the equator.

The western coast of the Cape colony is sandy and barren, with here and there a spring of water and a little verdure in the valleys. On it is the beautiful harbour of Saldanha, whose shores are surrounded by sterility. From the Orange River to Cape Negro, in lat. 16. S., upwards of 1000 miles, the whole coast consists of sand-hills, without a tree or a drop of water, having only in all this distance three bays entirely exposed to the north-west winds, the Great Fish Bay, Walvisch Bay, and Angra Pequina. From Cape Negro, where the hilly country commences, to the equator, are the Portuguese settlements of Caconda, Benguela, Angola, Congo, and Loango, of the wealth and splendour of which we read so much in the old accounts of the Jesuits, who, to magnify their own merits and the success of their missions, exaggerated and falsified their reports and descriptions wherever they went. These colonies are now miserable in the extreme, and scarcely a trace remains among the wretched natives, a great part of whom are a sort of half-cast between Portuguese and Negroes, of former prosperity, or of that religion to which these holy fathers represented many hundred thousands to have been converted. To add to the general stock of misery in which these countries are involved, the person who at present (1829) holds the throne of Portugal has banished thither several hundred families, who must perish from famine and the climate. Till within a few years, the governors and lieutenant-governors, and officers of black troops, and other employees, had subsisted entirely by the abominable traffic in slaves; but this resource appears to have failed them, not in consequence of the expiration of the time allowed by treaty for carrying on that traffic, but because the interior has been completely exhausted of its negro population. Captain Tuckey's unfortunate expedition afforded some insight into the interior of the district of Congo. The extraordinary mortality that took place was never satisfactorily explained. The climate, after passing the falls, appears, by Captain Tuckey's journal, to have been excellent, the thermometer having never descended below 60° in the night, and seldom rising above 76° of Fahrenheit during the day, and the atmosphere being remarkably dry.' The slave-dealers towards the lower part of the river are described as the vilest of mankind, a mongrel breed of French, Portuguese, and Negroes. Above the cataracts the negro population was far more respectable, but so indolent, that with difficulty they could be prevailed on to assist, on any terms, to push forward the canoes. Captain Tuckey states his reasons for concluding that the source of the Zaire must be to the northward of the equator, probably in those high mountains, a portion of which are visible from the sea in the Bight of Biafra.

Proceeding to the northward, and crossing the equator, we arrive at the bottom of that great bay or indent generally known as the Gulf of Guinea, a part of which forms the Bights of Benin and Biafra. Beginning at Cape Palmas, the extreme western point of this gulf, we have in succession the Ivory Coast, the Gold Coast, and the Slave Coast, the last extending from the river Volta to Gabon under the line. The inhabitants of this great extent of coast are nearly the same, very much corrupted by their intercourse with Europeans, more especially at those several places where European settlements have been formed. They are all intolerably lazy, and the richness of the soil, and the great heat and constant moisture, enable them to be so, and at the same time may be considered as some excuse for indolence. Nothing can exceed the fertility of the coast of Guinea. Maize, rice, holcus of various species, yams, cassava, sugar-cane, fruits of every kind common to tropical climates, spices, peppers, gums of five or six sorts, the oil, the tallow, and the butter-tree, cotton, indigo, and various dye-woods, are produced with little labour, and many of them spontaneously. Behind the Ivory Coast elephants roam in the woods and savannahs, in the latter of which the grass and reeds are said to exceed the height of 20 feet, and into which these huge animals retire to rest: these are sometimes caught by the negroes setting fire to the thickets, but mostly by pitting. In Bambouk and Akim, and various other places, gold-dust is collected in the sand brought down the mountain streams, but in no great quantity.

Sierra Leone.

Higher up the coast is the settlement of Sierra Leone, which, as a place for civilizing the negroes by education and free labour, would appear to have entirely failed: it certainly is of very little value, either as a commercial or naval depot, and every body avoids it as much as possible, on account of its extreme insalubrity. Its chief value in a national point of view is the great quantity of ship-timber, said to be superior to oak, which is brought down the river from the interior, and imported at a lower price than English oak bears in the market. To the northward of this the half-cast Portuguese have a slave-dealing settlement among the Bissagos Islands; and higher up on the coast is the English colony on the river Gambia; and lastly, the French settlement on the Senegal. The chief articles of the trade which is carried on at the last two settlements, are spirituous liquors and tobacco; in return for gums of different kinds, bees-wax, a litle gold-dust, and ivory. The territory in the neighbourhood of these rivers is in possession of various mixed tribes, Moors, Arabs, Berbers, and Negroes; but the pure negro is rarely found among them, except in a state of slavery. The Felatas, under the name of Foulahs, are numerous; so are the Serrawolles of Galam, the Mandingos, the Bamboukis, the Feelops, the Jalofs, the Soosoos, and an endless number of tribes, half Mahometans, half Pagans, most of them of a treacherous and inhuman disposition, very little advanced in the arts, conveniencies, and manners of civilized life, and almost constantly at war with each other. The country inhabited by this description of people brings us to the commencement of the great desert of Zahara, the coast of which is occasionally inhabited by prowling Arabs looking out for shipwrecked vessels, which they plunder without mercy. This barren coast extends northerly as far as Suz, where the emperor of Morocco's dominions may be said to commence, though the Moors and Berbers on this skirt of the desert are a lawless race, and scarcely pay allegiance to any sovereign but of their own choosing.

Morocco.

Why this Barbary state should be dignified with the name of Empire is by no means obvious, unless it be that the title of Sultan has been translated into that of Emperor. The present ruler is a Shirif, or descendant of Mahomet. The country is of great extent, and very varied in its productions; but owing to the bad system of government, agriculture and commerce are both neglected, and the population scanty, the highest estimate of which cannot be considered to reach five millions, though Jackson, the loosest of all writers on Africa, has swelled it to fifteen millions, which is absurd. The Atlas Mountains, which occupy the central parts, send forth their fertilizing streams in every direction; and the perpetual snow which appears on one of the highest peaks, behind the city of Morocco, tempers the summer heat, and communicates a freshness to the climate, scarcely known in other parts of the African continent. Grain of every description may be raised in Morocco. All the fruits of Europe, and most of those of Asia, thrive remarkably well. The shrubby and herbaceous plants are rich and in great variety. The oaks of Atlas are of good dimensions, but forest trees in general are rather stunted in their growth. These are chiefly the quercus suber, and ilex, thuia, mimosa, cedar, walnut, and chesnut. The olive and *argan* (eleodendron) supply them with abundance of oil. They have black-cattle and broad-tailed sheep in abundance, and bees producing the finest honey and wax. But the late emperor Muley Soliman, in one of his despotic mandates, prohibited the exportation of oil, wheat, and wool, three of the most productive articles, which at once impoverished the agriculturists,—so much indeed, that wheat and barley have since been imported from Europe; and the nephew, who usurped the sovereign power, ruined the merchants and manufacturers of Fez by his excesses and extortions. All the foreign establishments at Mogadore have left the place, except one single English house. Only twelve small vessels entered that port during the year 1828, which amounted formerly to thirty or forty; and these twelve are stated to have found a bad market, and not half cargoes in return. The port of Santa Cruz has long been wholly abandoned by European traders, and the town is now little better than a heap of ruins. The trade from Tetuan, Tangier, and Rabat is very trifling.

The present emperor Muley Abderahman, like some of his predecessors, has been mostly employed, since his accession in 1821, in efforts to bring into proper submission his refractory subjects in the southern provinces, who have felt themselves strong enough to refuse paying contributions; and in levying additional taxes, taking off heads, and confiscating the property of those who have any, particularly that of Jews and Moorish merchants. Even the slave-trade with Soudan by means of the caravans has greatly diminished. There are very few Turks in Morocco. The population consists chiefly of Moors, Arabs, Berbers, Negroes, with all their varied mixtures, and Jews. The last are subject to the worst treatment, but, as it has been stated, "no insult, indignity, or oppression, prevents the Israelite from domiciliating himself wherever he happens to fix his abode. He is a plant that seems to be suited for every soil, and generally thrives best when the pruning-knife is most applied. Among the Moors he is made to suffer beyond what any nature but that of a Jew could bear; yet such is the ignorance of the ruling powers and their Moorish subjects, that the affairs of state could hardly be carried on without him. Most of the trades and professions are exercised by Jews; they farm the revenues; act as commissaries and custom-house officers, as secretaries and interpreters; they coin money; furnish and fabricate all the jewellery and silver ornaments and trappings for the sultans, beys, and bashaws, and their respective harems; and in return for all this they are oppressed by the higher ranks, and reviled and insulted by the rabble." Such is their situation in all the four Barbary states.

The chief cities of Morocco are, the capital of that name, supposed to contain about 30,000 inhabitants; Fez, about the same number; Mequinez, not quite so many; Tetuan, on the coast, about 20,000; and Tangier, 16,000. The buildings are flat-roofed, and the streets narrow and dirty. On the south are Tafilet and Segilmessa, once populous cities, but now depending mostly on the caravans to Soudan, which resort to these places. Still farther south, and bordering on the desert, is the Bled-el-Jereed, or country of dates. The manufactures are chiefly confined to cotton and woollen cloths, silks, paper, and morocco leather.

Algiers.

The Morocco territory is separated from that of Algiers by the desert of Angara, on which the Arabs pursue lions, ostriches, and antelopes, and plunder the defenceless traveller. The mountain chain of Atlas extends behind it, and separates it from the great desert. In front of these is a long tract of fertile country, productive of all kinds of grain and good fruits. Numerous rills pour down the sides of the mountains, some of which are frequently covered with snow, giving a freshness to the temperature, which is almost always agreeable. The southern parts of the range of mountains, and various places from the highest Atlas to the Gulf of Sidra, or the Syrtis, are inhabited by tribes of Berbers, usually called Shillooks, who very much resemble the Tuaricks of the desert.

The city of Algiers rises in the form of an amphitheatre on the side of a hill, surrounded by a wall, and having its sea-front completely protected by strong batteries, which have resisted every attempt against them save one—that of Lord Exmouth,—one of the most daring, the most doubtful in its issue, and most brilliant exploits on record. The city is said to contain 80,000 inhabitants. It is placed in the midst of a country well clothed with all manner of fruit-trees, among which are scattered a great number of villas or country seats, to which the inhabitants repair in the hot season. The city of Constantine is said to contain 100,000 souls. Its site is entirely covered with broken walls, cisterns, aqueducts, and other ruins. Shershell, the ancient Cæsarea, is covered with similar ruins of great extent and grandeur. Indeed the whole of this part of Africa exhibits the remains of temples, aqueducts, amphitheatres, triumphal arches, and other ancient edifices of extraordinary magnificence. Besides these, numerous other cities and modern towns are found in the interior and along the sea-coast, as Mascara, Oran, and Bona; near the last of which is the great coral fishery. The army is composed of Turks, who elect the dey, whose arbitrary power is in some degree mitigated by the divan, composed of the oldest and highest of the military officers. He acknowledges the sovereignty of the grand signior, and pays him an annual tribute. One of the chief sources of revenue is the monopoly of grain; to which are added, confiscations, taxes on the Jews and other foreigners, and the sale and ransom of prisoners, which has been greatly diminished since the Barbary powers have been compelled, by the interference of England, to liberate all Christian slaves.

Tunis.

Bordering on Algiers, and to the eastward of it, is Tunis, once the flourishing capital of the Carthaginian power. The hereditary bey is neither Turk nor Moor, but the descendant of a Greek renegado and a Genoese slave. Christians and Jews are less subject in this state to oppression and insult than in any of the other three; and the Tunisians are also less addicted to piracy. Their great pursuit is agriculture and commerce, which are mostly in the hands of the Moors; but a vast number of Nomade Arabs are scattered over the interior of the country. The cattle and horses are small, but the sheep are of a large size. The southern side of the tail of the Atlas range of mountains is sandy and barren, and a desert intervenes between it and the oasis of Ghadamis, which, from its position, ought to belong to Tunis, but nominally is under the dominion of the bashaw of Tripoli. The crops of grain are very fine, and the Tunisians have all the fruits that are common to the other states.

The city of Tunis, if we except Cairo, is the first in all Africa, and possesses a well-fortified harbour. The Goletta, a strong fortress, commands the roadstead, and the entrance of the lagoon or lake, which, however, is navigable only by boats. The ruins of ancient Carthage appear a little to the north-west of it. The ruins of the works that formed her harbour, and the remains of an aqueduct, are still visible. In the interior is the Arabian city of Cairoan, which for many centuries was reckoned the capital of Africa, but of which little is known at present. Its principal mosque is reported by the Moors to be supported by 500 columns of granite. Along the coast are several towns and small harbours, as Sooza, Gabes, and Porto-Farina, near which the ancient Utica was situated, where the younger Cato underwent a voluntary death. In all the towns of this state are considerable manufactories of silks, velvets, cloths, and morocco leather, and a peculiar kind of red cloth cap, which is very much worn by the seamen and peasantry of the coasts of the Mediterranean.

Tripoli.

The state of Tripoli may be said to extend from the Lesser Syrtis or Gulf of Gabes to the eastern extremity of Barca, on the confines of Egypt. On its deserts and its arid mountains are numerous tribes of Nomade Arabs, Moors, and Tuaricks or Berbers, who frequently threaten the bashaw in his capital. It has a tolerably good harbour, and a strong castle to command both it and the town. To the eastward is Lebida, the ancient *Leptis Magna*, where the remains of temples, triumphal arches, and aqueducts, are still visible. The French carried off a great number of large and beautiful columns; and Captain Smyth of the British navy sent home several shafts and capitals, which were lying for a long time in the court-yard of the British Museum. Farther east is the town and bay of Mesurata, and beyond it the Libyan Pentapolis, the ruins of whose five cities, Cyrene, Barce, Ptolemais, Berenice, and Taukera, still exist, under names scarcely dissimilar from their ancient appellations, and are still inhabited as towns and villages, but with a very different description of people. Cyrene was undoubtedly the most ancient and splendid of the Greek colonies on the coast of Africa, whose ruins and catacombs, scattered along the summit of the third stage of hills, or last terrace which overlooks the Mediterranean, are still magnificent. The succession of terraces corresponds very accurately with the description given of the face of the country by Herodotus; and among the splendid ruins still flows the limpid spring described by him, along whose verdant banks the Arab now pitches his tent. Tolemata or Ptolemais, in the port of Barca, preserves its ancient walls, covered with inscriptions; and the ruins of its temples and arches are all to be traced. Here, indeed, we are on classic ground; and modern travellers have fancied even to have discovered the gardens of the Hesperides. At Derné the country puts on a beautiful appearance, and receives fertility from the rills descending from the mountains. It is governed by a bey appointed by the bashaw of Tripoli, and so is Bengazi. These two towns are inhabited by Moors, Jews, and Arabs; but the greater part of the country is in possession of the wandering tribes of Arabs, who pasture their flocks as far as the oasis of Audjela, and along the edge of the desert to Fezzan, both of which are, nominally at least, dependent on the bashaw of Tripoli. Of the sea-coast of this part of Africa, from Tripoli round the Greater Syrtis, of the Cyrenaica, and to the confines of Egypt, we have the best detailed information as to its present state, its antiquities, and productions, from Della Cella and Mr Beechey.

Interior of Northern Africa.

It is quite true, as Major Rennell has observed, that "nothing can evince the low state of African geography more than M. D'Anville's having had recourse to the works of Ptolemy and Edrisi to compose the interior part of his map of Africa in 1749." This map, and indeed all that have followed of the interior, are now (1829) rendered nearly worthless by the discoveries of modern travellers. The first traveller who made much progress into the interior was Mungo Park, who proceeded from Pisania, on the river Gambia, to Medina, Fatteconda, Kemmoo, Jarra in Ludimar, the frontier town of the Moors, who took him prisoner, and confined him at Benown for two months. On being released, he travelled, chiefly by the charity of negroes, through a wooded country to Sego, where he fell in with the Niger, so named by Leo Africanus, who supposed it to be the Niger of Pliny. From Sego, continuing his journey along the banks of the river, he reached Silla, from which place he deemed it prudent to return, on account of the jealousy of the Moors, whose ill treatment he had already experienced. Returning by a more southerly route, along the northern banks of the great river thus discovered, as far as Bammakoo, where it appears first to become navigable, and passing through Manding, Konkodoo, Dentila, Neola, and Tenda, he at length reached Medina on the Gambia, having added greatly to our knowledge of this part of Africa. We have no account of his proceeding farther in his second journey than Sansanding, a little way beyond Sego; and all account of his discoveries from thence to Boussa, where he was wrecked, has perished with him. That he did so perish at that place, is rendered certain by the visit of Clapperton, and subsequently by that of his servant Lander.

Darfoor.

To Mr Browne we owe whatever particulars he was able to collect (and, being kept a prisoner, they were not many) concerning Darfoor and the position of the oasis and ruins of the temple of Jupiter Ammon; the latter of which were afterwards corroborated by Horneman. From a vocabulary of the language of the natives of this oasis, Mr Marsden came to the conclusion that they were the same people as the Tuaricks, who inhabit the western part of the great desert from Morocco to Timbuctoo. In this oasis, and that of Augela, the inhabitants grow a little grain, and cultivate fruits and vegetables, chiefly dates. The women are mostly employed in weaving a coarse woollen cloth, the only covering they wear. The largest of the several islands interspersed among the sands of the desert, or rather a cluster of them, is Fezzan, the ancient Garamantes, whose chief town is Mourzouk. This is the intermediate station in the desert for the trade of Bornou and Soudan with Egypt and Tripoli, receiving gold-dust, slaves, and horses, in exchange for salt, fruit, and vegetables, goats and sheep for the caravans. The population of this oasis is stated to be from 70,000 to 80,000 souls. They cultivate barley, maize, pulse, and dates; figs and pomegranates grow in abundance. They have no water, but what they receive from partial springs or deep wells, and it is generally brackish, from the salt and natron with which the soil abounds.

The Zahara or Great Desert.

The Zahara or Great Desert has also its oases, and wadeys or valleys, in which springs of water are found, and shrubby plants, chiefly stunted accacias, and tufts of grass. For hundreds of miles, however, the surface is one continued plain of sand, in some places blown up into high ridges, in others in undulating lines, like the waves of the sea. In parts of the desert, insulated hills of naked sandstone rock, or ridges of hills, rise out of the sandy or stony surface, appearing like so many islands in the ocean. Many indeed have supposed that the Zahara must once have been the bed of the ocean, judging from the springs and pools of salt water, the flags of rock-salt, the beds of natron, and the saline particles that abound in the sand, and also from the shells and fragments of marine animals that are found in the limestone of Augela and other parts of the desert. On the eastern side is the *Bahr Bellama*, or sea without water; and Riley describes an immense ravine on the side of the Atlantic, running from the sea-shore more than 300 miles into the interior, full of salt water springs, and the sandy surface incrusted with marine salt, which "crumbled," he says, "under the feet of the camels like a crust of snow." The banks of this deep ravine were distant from each other eight or ten miles, and were from 500 to 600 feet high. This valley Riley calls the bed of an arm of the sea, and supposes it to lie somewhere about the 20th parallel of latitude. Other travellers describe ravines of the same kind between the southern foot of the Atlas Mountains and the Zahara, like so many deep beds of a formerly existing sea, with incrustations of salt, rolled pebbles, and broken shells. It would be very desirable to trace the levels somewhere across the northern commencement of the Zahara, from the bottom of the Gulf of Syrtis to the Atlantic. We know nothing of the southern face of the Mauritanian Atlas, and the plains of Segilmessa, and the Bled-el-Jereed, or land of dates; and we cannot help thinking, that while we are sending out travellers to perish in the central parts of Africa, it would be as well, in the first place, to obtain a knowledge of the emperor of Morocco's dominions; more especially of those parts to the southward of Atlas, and contiguous to the Great Desert. It has been suggested that the whole country between the Syrtis and the Atlantic, over which the Atlas chain extends, may have once been insulated, and in that state formed the celebrated Atlantis. This, however, is not very probable, but might easily be determined by a series of levels.

Inhabitants of the Desert.

The Zahara, miserable as it is, is not wholly without inhabitants. On the western shore are scattered a few Moorish and Arab shepherds and goat-herds, usually looking out for plunder of shipwrecks. Towards the centre are the Tuaricks, traders in salt, and robbers of the caravans; and to the eastward, chiefly in the neighbourhood of the salt-water pools and marshes of Bilmah, are the Tibboos, a less pure people than the Tuaricks, who also collect salt for the Bornou market, and feed a few sheep and goats.

Soudan.

The Desert ceases in about 15. north latitude, sloping gradually down to the fertile and well-watered countries of Bornou on the east, Houssa in the centre, and the regions already mentioned to the westward of Timbuctoo. Houssa and Bornou collectively comprehend that region of Africa known by the name of Soudan, or Land of the Blacks: the former is under the rule of the Sultan Bello, a descendant of the Foula tribe, called by the negroes Foulatas or Fellatas; and the latter is governed by the Sheik el Kanemy of some Arab tribe. These two chiefs, dividing this fine country between them, are, or recently were, in a state of hostility, by which the poor and peaceable negroes are made to suffer greatly. The *élite* of the black troops of Bornou are habited in coats of mail, composed of iron chains, with helmets or skull-caps of the same metal. The heads of their horses are also defended by plates of iron or brass, sufficient room being left only for the eyes of the animal.

Bornou.

There are 13 principal towns in Bornou. Kouka, the modern capital, is situated on the eastern border of the lake Tsad. Among the other principal towns are New Birnie, Old Birnie, Affagy, Angola, Kabshary, Showy, and Angornow; the last of which is said to be the largest town in Bornou, and supposed to contain about 30,000 inhabitants. The market held at this place every Wednesday, is said by Denham to be attended sometimes by 80,000 or 100,000 persons. Bornou is intersected by two considerable rivers which fall into the Tsad; the Yeou, which has its rise in a ridge of hills about Katagum, and which divide this country from that of the Fellatas; and the Shary, whose source is unknown, but which falls into the lake from the southward. Kanem, to the north of the lake, and Baghermi to the westward, are dependent on Bornou; but the country to the southward of it, and as far as the great range of mountains, is in possession of the Fellatas. On all sides of the lake are tribes of Arabs in great numbers, particularly those of the Shoua tribe of Beni Hassan, feeding their numerous flocks and herds.

The climate is far from being healthful. Though situated between the 10th and 15th parallels of latitude, the cold of winter is sometimes very severe, the thermometer rarely reaching 74° or 75°, while in the mornings it usually stands at 58° or 60°. In summer it rises sometimes to 105° and 107°, with suffocating and scorching winds from the south and south-east. During the rains of summer, from the extreme flatness of the country, tracts of many miles in extent are converted into lakes. The soil is rich, but the people are indolent, and cultivate little for food but a species of millet, which they call *gressub*, and three or four kinds of beans known by the name of *gufooly*, the common food of slaves and the poorer class of people. Indian corn, cotton and indigo, with a little senna, make up nearly the catalogue of their husbandry. Indigo indeed grows wild, and with it they dye their blue tobes or frocks. They have domestic fowls in great numbers; and all the quadrupeds and birds which have been already mentioned, besides many others, are natives of the woods, the lakes, and the plains of Bornou. They have little commerce except with the people of Fezzan and Tripoli, chiefly supplying the Moors with slaves, horses, elephants' tusks, and ostrich feathers, receiving in return red caps, brass basins, coral, fire-arms, powder and shot, swords, and salt.

Houssa, the Fellata country.

The Soudan population consisted originally of negroes; but the Arabs, and the Moors, and the Berbers have converted it into a mixed race, in which not only the features have been changed, but the native simplicity of the pure Ethiopian destroyed, if we may judge from the character and disposition of the unmixed negroes, whom Clapperton met with to the southward, beyond the line to which the Fellatas had carried their conquests. Corrupted as they are within the limits subjected by these people, Clapperton speaks of them in high terms of praise. In his way to Soccatoo, the residence of Bello, the country not only improved in appearance, from the moment he crossed the Bornou boundary, but the valleys were well peopled and cultivated, and the plains were covered with herds of cattle. Crowds of people were on the road from the market of Kano, bearing their purchases on bullocks, on asses, or on their heads. This city, the Ghana of the Arabs, is the great emporium of Houssa, about 15 miles in circumference, surrounded with a clay wall about 30 feet high, having a dry ditch within and without. The space within contains fields, orchards, and gardens. It is said to contain from 30,000 to 40,000 inhabitants. The market is well stocked with goods from every part of Northern Africa, and with European articles, even to English umbrellas. From Kano to Soccatoo the country increased in population, and town followed town in quick succession, most of them surrounded with walls and ditches. Clapperton says that this part of the country resembled one of our English ornamented parks, clothed with woods and clumps of trees.

Bello sent out 150 of his horsemen with drums and trumpets to meet this traveller, and escort him to Soccatoo. This city he considered to be the most populous of any he had met with in Africa, though it was founded only in 1805; but the mud walls of an African town are soon run up, and as soon demolished. It is situated in long. 6. 12. E. lat. 13. 5. N., near to a small river which, rising in the hills between Kashna and Kano, and running to the west, is said to fall into the Quorra (Niger) at four days' journey to the westward of Soccatoo. There is one city of considerable strength at no great distance from Soccatoo, which Bello has not been able to conquer. It is named Goober, and the people, by the sultan's own account, "are free-born, because their origin is from the Copts of Egypt." Clapperton, on his second visit, was present at the siege of this place, of which he gives an amusing account, not very creditable to the army of Bello.

Negro nations of the interior.

By the second journey of this unfortunate traveller we are made acquainted with the manners and habits of a negro population in the interior, behind or to the northward of the range of mountains that are supposed to cross Northern Africa like a belt. From the Bight of Benin to Soccatoo large and populous kingdoms follow each other, containing towns and cities of mud houses, surrounded with mud walls, peopled with 10,000, 15,000, 20,000, and even 40,000 inhabitants; the country well cultivated, and the people employed in various manufactures for domestic use; such as weaving, dying, tanning, working in iron and other metals, and in pottery. In all the towns he found them a good-humoured, but a vitious and licentious set, both male and female; fond of music, dancing, and drinking booza; extremely superstitious, and placing confidence in the power of various charms. The chief or king of Yourriba had as many wives, he told Clapperton, as, if linked hand in hand, would reach from one end of his kingdom to the other; but these queens are less for luxury than for use, being employed in all kinds of hard labour. The emperor of China does not receive from his ministers more humiliating submission than does the king of Yourriba from his black vassals, who fall flat on their bellies before him, and cover themselves with dust.

Next to Yourriba is the kingdom of Borghoo, whose capital is Kiama, famous for its horses. The sultan is attended by a body-guard of young females, when he makes his appearance in public. He waited on Clapperton, attended by six naked young girls, from 15 to 17 years of age, a white bandeau or fillet of white cloth round the fore-head, and a string of beads round the waist, being their only clothing. Each carried three light spears. "Their light form, the vivacity of their eyes, and the ease with which they appeared to fly over the ground, made them appear something more than mortal, as they flew alongside his horse." The subjects of Borghoo had the reputation of being great robbers, but Clapperton received nothing but civility in passing through their country. Kiama is said to contain 30,000 inhabitants. From hence he proceeded to Wawa, a town with 18,000 inhabitants, also belonging to Borghoo.

From Wawa our traveller proceeded to the northward as far as Boussa, situated on the Quorra, for the purpose of gaining information respecting the death of Mungo Park, which happened at this spot of the river. The reports varied, though they all agreed in the main point, that the boat upset over a ledge of rocks which here crosses the river, and the few that were in her were unfortunately drowned. It appears, too, that by a mistake they were engaged in hostility at the moment with the natives on shore. On Lander's return, the sultan of Boussa employed him in cleaning some muskets, six of which had the Tower mark upon them. Clapperton got some indirect information respecting Park's papers, but it appeared doubtful whether they were still in existence. On his return to Wawa, he fell in with a coffle or caravan, from Ashantee to Houssa, which occupied a long line of march, consisting of bullocks, asses, horses, and women and men to the amount of a thousand persons. From Wawa he proceeded to the ferry of the river Quorra, which was here about the width of the Thames at Westminster. Having crossed the river, the first town was Koolfa, in Nyffé, a walled town, containing from twelve to fifteen thousand inhabitants, Mussulmans and Pagans. Here the whole night was spent in singing, dancing, and drinking booza. Beyond this, towns and villages increased in number, and the fields were better cultivated than had hitherto been the case; but every labourer was armed to protect himself against the inroads of the Fellatas, who were very numerous in this part of Africa.

Zaria, the capital of Zeg-zeg, is a large Fellata city, as populous as Kano, and has several Mahometan mosques with minarets; and the houses are flat-roofed. The environs are stated to be very beautiful and well cultivated, which continues to be the character of the country the whole way from thence to Kano. On the whole, it may be collected from this interesting journey of Clapperton, that though sobriety and chastity form no part of the character of the native negroes, they are a happy, kind-hearted, and sociable people, undergoing just as much labour as is necessary to procure them food, clothing, and booza; and, having accomplished this, preferring to bask in the sun, or to sleep in the shade all day, and to commit all kinds of debauchery in the night; just like the booza-drinkers of Berber and Shendi, as described by the late Mr Burckhardt.

It would appear, from the journal of Clapperton's servant, on his return by a more easterly route, that the inhabitants are several degrees lower in the scale of civilisation than those more to the westward. In one place, men, women, and children exposed themselves without any covering whatever; and a range of hills to the eastward of his route was pointed out as being inhabited by a ferocious tribe of people called *Yam-yams*, who were declared by all to be cannibals. The Sultan Bello assured Clapperton that he had seen these people eat human flesh. These, however, may be considered as exceptions. The great mass of the people are gentle and docile; but so long as the Fellatas send out their marauding parties to carry off slaves and cattle, there is little reason to expect they will make any progress in civilisation. Domestic slavery has in all probability existed among them for ages past, and even yet the slave appears to be treated like any other member of the family; but the foreign slave-trade, that greatest of all curses, leads to perpetual wars among neighbouring tribes, it being well known that a coffle of human beings is a species of traffic easiest to be conveyed to the sea-coast, and fetches there the highest prices, for which the venders are enabled to purchase in return ardent spirits and other articles suited to their depraved appetites. There is one way, and but one, of putting an end to this infamous traffic, and that is by all the maritime nations of Europe and America declaring it to be piracy; but there are too many interested in its continuance to allow us to indulge a hope that this will ever be done.

Improved geography of Northern Africa.

The discoveries of Clapperton and Denham have done much to reform the geography of Northern Africa, the maps of which were disgraceful to that branch of knowledge in the nineteenth century. All those gratuitous lakes, rivers, and mountains, put down at random to fill up the vacant paper, may now be swept away, and those cities or towns that do exist, be placed in their proper situations; some of which, before the late expeditions, were from 300 to 500 miles out of their true positions. The Arab writers, from Edrisi downwards, appear to have been wholly ignorant of the course of the Joliba or Quorra, some making it run directly eastward, as far as the Nile of Egypt, and others in a contrary direction. Some placed the cities of Kashna, Kano, Nyffé, &c. along its banks, all in an easterly series; mistaking possibly, as they make no use of river navigation, the Yeou for a continuation of the said Quorra; a mistake that a very ingenious French writer has fallen into, even subsequently to the publication of Clapperton's journal; and an English author has also done the same, and carried its waters *under ground* through the Great Desert, and into the Gulf of the Syrtis. We now know that, at some distance beyond Timbuctoo, the Joliba or Quorra, the Niger of modern days, turns off to the southward, passes to the westward of Soccatoo, through Boussa, where Park was wrecked, skirts the province of Nyffé, and continues to flow southerly to at least the 9th parallel of latitude; and here all information as to its course ceases. But there can only be two alternatives,—either that it penetrates the range of granite mountains, whose width is somewhere about 80 miles, and height from 2000 to 3000 feet, and falls into the Bight of Benin, through the river Formosa,—or, that it turns off to the eastward, joins the Shary, and falls into the lake Tsad. Testimonies, such as they are, have been procured in favour of both suppositions; and if those for the latter course are the most strong, those for the former may perhaps be considered as the more probable. In what direction the waters of the Tsad discharge themselves, is as yet mere conjecture, as little is known for certain to the eastward of that lake; but the water of the lake being at all times fresh, which it could not be if discharged only by evaporation, there must be some outlet, and that outlet will probably be found on the yet unexamined eastern side, creeping on in a connected chain of nearly stagnant pools to the "dead-flowing" stream of the Bahr-el-Abiad.

The Bahr-el-Abiad, as far as it has yet been traced from its junction with the Nile, strongly favours this supposition. It has been ascended as far as Aleis, by Monsieur Linant, in the employ of the African Association. It has been ascended by M. Rouppel; and Lord Prudhoe and Major Felix ascended it to a considerable distance, and obtained some curious information of the country through which it passes, and the singular character of the river. For a great part of the year it is very shallow, and the water nearly stagnant; its width extends from two to twenty miles; and it is thickly studded with islands that are covered with fine forest-trees. In this state it resembles an endless lake rather than a river; but when the freshes come down, about the same time as the Nile begins to swell, they are not gradual, like those of that river, but the torrent rises with great rapidity, sweeping all before it, and bringing down most extraordinary multitudes of fish. These circumstances led the travellers to conclude that it was supplied from some great reservoir far in the west, and that this reservoir is probably the lake Tsad. Some of the officers of the pasha of Egypt's army had been nearly 400 miles up the river, still coming from the setting sun; and in that direction not a mountain nor a hill of any size was visible. It would seem, therefore, to form a sort of great drain to carry off the waters of Bornou, and of the continuous low swampy country reported to extend easterly from Bornou, in which the lake Fittré and other lakes are said to be situated.

The Bahr-el-Azrek and the Nile may be considered as one and the same river: they have the same character in all respects; the same high banks, with the same dark soil, which gives a colour to the water: the same birds, the same fish, and the same plants, accompany both; but the Bahr-el-Abiad and the Nile are totally different. Low meadow banks accompany the former, as far as it has been traced; the birds, the fish, and the animals, are wholly distinct. The elephant, the hippopotamus, and the rhinoceros, are here found in whole herds. They are unknown in the neighbourhood of the Nile. The water of the one is black and turbid; of the other it is of a white opal colour. The only difficulty in exploring this interesting river upwards seems to be the hostility of a tribe, at 150 or 200 miles from its junction with the Nile, called Shillooks, who are a large race of men, entirely black, and without clothing, and are represented by their lower neighbours, not exactly as cannibals, for they never can want fish to eat, but as a very fierce and savage race. But the real character of people living in a savage state is not to be procured from their neighbours, especially when in a state of warfare with each other. The Shillooks, however, may easily be passed, by proceeding through the Denka country on the right bank, or to the southward between the mountains and the Bahr-el-Abiad, where an intelligent sheik of the name of Idrees Adelan resides; who, being now subject to the pasha of Egypt, would readily conduct any traveller, recommended by the pasha, beyond the territory of these formidable blacks, where would probably be met some of those pastoral tribes of Arabs that are known to feed their flocks along this prolonged valley of Soudan, even to the confines of Bornou. An expedition from the Nile to Bornou through this tract of country, the most fertile probably in the whole interior, would afford materials to complete the geography of Northern Africa. (M.)

AFRICAN COMPANY. See COMPANY.

AFRICAN INSTITUTION. This institution was formed in 1807. Its general objects, and the views which influenced its formation, are clearly stated in the following resolutions, adopted at the constituent meeting, held on the 14th of April 1807.

"1. That this meeting is deeply impressed with a sense of the enormous wrongs which the natives of Africa have suffered in their intercourse with Europe; and, from a desire to repair those wrongs, as well as from general feelings of benevolence, is anxious to adopt such measures as are best calculated to promote their civilisation and happiness.

"2. That the approaching cessation of the slave-trade, hitherto carried on by Great Britain, America, and Denmark, will, in a considerable degree, remove the barrier which has so long obstructed the natural course of social improvement in Africa; and that the way will be thereby opened for introducing the comforts and arts of a more civilized state of society.

"3. That the happiest effects may be reasonably anticipated from diffusing useful knowledge and exciting industry among the inhabitants of Africa, and from obtaining and circulating throughout this country more ample and authentic information concerning the agricultural and commercial faculties of that vast continent; and that, through the judicious prosecution of these benevolent endeavours, we may ultimately look forward to the establishment, in the room of that traffic by which Africa has been so long degraded, of a legitimate and far more extended commerce, beneficial alike to the natives of Africa and to the manufacturers of Great Britain and Ireland."

The particular means which this society proposes to employ for promoting civilisation and improvement in Africa, are of the following kind:—

"1. To collect and diffuse, throughout this country, accurate information respecting the natural productions of Africa, and, in general, respecting the agricultural and commercial capacities of the African continent, and the intellectual, moral, and political condition of its inhabitants.

"2. To promote the instruction of the Africans in letters and in useful knowledge, and to cultivate a friendly connection with the natives of that continent.

"3. To endeavour to enlighten the minds of the Africans with respect to their true interests, and to diffuse information amongst them respecting the means whereby they may improve the present opportunity of substituting a beneficial commerce in place of the slave-trade.

"4. To introduce amongst them such of the improvements and useful arts of Europe as are suited to their condition.

"5. To promote the cultivation of the African soil, not only by exciting and directing the industry of the natives, but by furnishing, where it may appear advantageous to do so, useful seeds and plants, and implements of husbandry.

" 6. To introduce amongst the inhabitants beneficial medical discoveries.

" 7. To obtain a knowledge of the principal languages of Africa, and, as has already been found to be practicable, to reduce them to writing, with a view to facilitate the diffusion of information among the natives of that country.

" 8. To employ suitable agents, and to establish correspondences as shall appear advisable, and to encourage and reward individual enterprise and exertion in promoting any of the purposes of the institution."

The management of the affairs of this institution is vested in a patron and president, 20 vice-presidents, a treasurer, and a board of 36 directors. These officers are chosen annually from among that class of the subscribers who are called *governors* of the institution. Those who subscribe 60 guineas at one time become hereditary governors; but 30 guineas subscribed at one time makes the subscriber a governor for life; or three guineas annually, a governor during the continuance of this annual subscription. Every subscriber of one guinea becomes an ordinary member, and continues so during the continuance of his subscription.

The proceedings of the society are fully detailed in its annual reports, which are regularly published. These reports contain much valuable and interesting information in regard to Africa, and the means of civilizing it.

AFRICANUS, JULIUS, an excellent historian of the third century, the author of a chronicle which was greatly esteemed, and in which he reckons 5500 years from the creation of the world to Julius Cæsar. This work, of which we have now no more than what is to be found in Eusebius, ended at the 221st year of the vulgar era. Africanus also wrote a letter to Origen on the history of Susanna, which he reckoned supposititious; and we have still a letter of his to Aristides, in which he reconciles the seeming contradictions in the two genealogies of Christ recorded by St Matthew and St Luke.

AFSLAGERS, persons appointed by the burgomasters of Amsterdam to preside over the public sales made in that city. They must always have a clerk of the secretary's office with them, to take an account of the sale. They correspond to our brokers, or auctioneers.

AFT, in the sea language, the same with ABAFT.

AFTERMATH, in *Husbandry*, signifies the grass which springs or grows up after mowing.

AFTERNOON, the latter half of the artificial day, or that space between noon and night.

AFWESTAD, a large copper-work belonging to the crown of Sweden, which lies on the Dala, in the province of Dalecarlia, in Sweden. It looks like a town, and has its own church. Here they make copper-plates; and have a mint for small silver coin, as well as a royal post-house. Long. 14. 10. E. Lat. 58. 10. N.

AGA, in the Turkish language, signifies a great lord or commander. Hence the aga of the janizaries is the commander-in-chief of that corps; as the general of horse is denominated *spachiclar aga*. The aga of the janizaries is an officer of great importance. He is the only person who is allowed to appear before the grand signior without his arms across his breast in the posture of a slave. Eunuchs at Constantinople are in possession of most of the principal posts of the seraglio: the title *aga* is given to them all, whether in or out of employment. This title is also given to all rich men without employ, and especially to wealthy landholders.

We find also *agas* in other countries. The chief officers under the khan of Tartary are called by this name; and among the Algerines we read of *agas* chosen from among the *boluk bashis* (the first rank of military officers), and sent to govern in the chief towns and garrisons of that state. The *aga* of Algiers is the president of the divan or senate. For some years the *aga* was the supreme officer, and governed the state in place of the bashaw, whose power dwindled to a shadow. But the soldiery rising against the *boluk bashis* or *agas*, massacred most of them, and transferred the sovereign power to the caliph, with the title of *Dey* or King.

AGADES, a kingdom and city of Negroland, in Africa. It lies nearly under the tropic of Cancer, between Gubur and Cano. The town stands on a river that falls into the Niger; it is walled, and the king's palace is in the midst of it. The king has a retinue, who serve as a guard. The inhabitants are not so black as other negroes, and consist of merchants and artificers. Those that inhabit the fields are shepherds or herdsmen, whose cottages are made of boughs, and are carried about from place to place on the backs of oxen. They are fixed on the spot of ground where they intend to feed their cattle. The houses in the city are stately, and built after the Barbary fashion. This kingdom was, and may be still, tributary to the king of Timbuctoo. It is well watered; and there is great plenty of grass, cattle, senna, and manna. The prevailing religion is the Mahometan, but it is not rigidly practised. Long. 9. 19. E. Lat. 26. 10. N.

AGALMATA, in *Antiquity*, a term originally used to signify any kind of ornaments in a temple, but afterwards for the statues only, which were most conspicuous.

AGAMEMNON, the son of Atreus by Aerope, was captain-general of the Trojan expedition. It was foretold to him by Cassandra, that his wife Clytemnestra would be his death: yet he returned to her; and accordingly was slain by Ægisthus, who had gained upon his wife in his absence, and by her means got the government into his own hands.

AGAN, one of the Ladrone Islands. The circumnavigator Magellan was assassinated here in the year 1525.

AGANIPPE, in *Antiquity*, a fountain of Bœotia, at Mount Helicon, on the borders between Phocis and Bœotia, sacred to the Muses, and running into the river Permessus. Ovid seems to make *Aganippe* and *Hippocrene* the same. Serenus more truly distinguishes them, and ascribes the blending of them to poetical licence.

AGANIPPIDES, in ancient poetry, a designation given to the Muses, from a fountain of Mount Helicon called *Aganippe*.

AGAPE, in *Ecclesiastical History*, the love-feast, or feast of charity, in use among the primitive Christians, when a liberal contribution was made by the rich to feed the poor. The word is Greek, and signifies *love*. St Chrysostom gives the following account of this feast, which he derives from the apostolical practice. He says, "The first Christians had all things in common, as we read in the Acts of the Apostles; but when that equality of possessions ceased, as it did even in the apostles' time, the *agape* or love-feast was substituted in the room of it. Upon certain days, after partaking of the Lord's Supper, they met at a common feast; the rich bringing provisions, and the poor who had nothing being invited." It was always attended with receiving the holy sacrament; but there is some difference between the ancient and modern interpreters as to the circumstance of time, viz. whether this feast was held before or after the communion. St Chrysostom is of the latter opinion; the learned Dr Cave of the former. These love-feasts, during the first three centuries, were held in the church without scandal or offence; but in aftertimes the heathens began to tax them with impurity. This gave occasion to a reformation of these *agapæ*. The kiss of charity, with which the ceremony used to end, was no longer given between different sexes; and it was expressly forbidden to have any beds or couches for the conveniency of those who should be disposed to eat more at their ease. Notwithstanding these precautions, the abuses committed in them became so notorious, that the holding of them (in churches at least) was solemnly condemned, at the council of Carthage, in the year 397.

AGAPETÆ, in *Ecclesiastical History*, a name given to certain virgins and widows, who, in the ancient church, associated themselves with and attended on ecclesiastics, out of a motive of piety and charity.

In the primitive days there were women instituted deaconesses, who, devoting themselves to the service of the church, took up their abode with the ministers, and assisted them in their functions. In the fervour of the primitive piety, there was nothing scandalous in these societies; but they afterwards degenerated into libertinism; insomuch that St Jerome asks, with indignation, *unde agapetarum pestis in ecclesias introiit?* This gave occasion for councils to suppress them. St Athanasius mentions a priest, named Leontius, who, to remove all occasion of suspicion, offered to mutilate himself, to preserve his beloved companion.

AGARD, ARTHUR, a learned English antiquary, born at Foston, in Derbyshire, in the year 1540. His fondness for English antiquities induced him to make many large collections; and his office as deputy chamberlain of the exchequer, which he held 45 years, gave him great opportunities of acquiring skill in that study. Similarity of taste brought him acquainted with Sir Robert Cotton and other learned men, who associated themselves under the name of *The Society of Antiquaries*, of which society Mr Agard was a conspicuous member. He made the Domesday book his peculiar study, and composed a work purposely to explain it, under the title of *Tractatus de Usu et obscurioribus Verbis libri de Domesday*. He also compiled a book for the service of his successors in office, which he deposited with the officers of the king's receipt, as a proper index for succeeding officers. All the rest of his collections, containing at least 20 volumes, he bequeathed to Sir Robert Cotton; and died in 1615.

AGARIC MINERAL, a marly earth, resembling the vegetable of that name in colour and texture.

AGARO, an island of Sweden, in the province of Westmanland, on the same estuary on which Stockholm is situated.

AGATE, or ACHAT (among the Greeks and Latins Αχατης; and *Achates*, from a river in Sicily, on the banks of which it was first found), a very extensive genus of the semipellucid gems.

These stones are variegated with veins and clouds, but have no zones like those of the onyx. They are composed of crystal debased by a large quantity of earth, and neither formed by repeated incrustations round a central nucleus, nor made up of plates laid evenly on one another, but are merely the effect of one simple concretion, and variegated only by the disposition given by the fluid they were formed in to their differently coloured veins or matters.

Agates are arranged according to the different colours of their ground. Of those with a *white* ground there are three species. 1. The *dendrachtes, mocoa stone*, or *arborescent agate*. This seems to be the same with what some authors call the achates with rosemary in the middle, and others achates with little branches of black leaves. 2. The *dull milky-looking agate*. This, though greatly inferior to the former, is yet a very beautiful stone. It is common on the shores of rivers in the East Indies, and also in Germany and some other parts of Europe. Our lapidaries cut it into counters for card-playing, and other toys of small value. 3. The *lead-coloured agate*, called the *phassachates* by the ancients.

Of the agates with a *reddish* ground there are four species. 1. An impure one of a flesh-coloured white, which is but of little beauty in comparison with other agates. The admixture of flesh colour is but very slight; and it is often found without any clouds, veins, or other variegations; but sometimes it is prettily veined or variegated with spots of irregular figures, having fimbriated edges. It is found in Germany, Italy, and some other parts of Europe, and is wrought into toys of small value, and often into the German gunflints. It has been sometimes found with evident specimens of the perfect mosses bedded deep in it. 2. That of a pure blood colour, called *hæmachates*, or the *bloody agate*, by the ancients. 3. The clouded and spotted agate, of a pale flesh colour, called by the ancients the *carnelian achates* or *sardachates*. 4. The red-lead coloured one, variegated with yellow, called the *coral agate*, or *coralla achates*, by the ancients.

Of the agates with a *yellowish* ground there are only two known species; the one of the colour of yellow wax, called *cerachates* by the ancients; the other a very elegant stone, of a yellow ground, variegated with white, black, and green, called the *leonina*, and *leontesera*, by the ancients.

Lastly, Of the agates with a *greenish* ground, there is only one known species, called by the ancients *jaspachates*.

Of all these species there are a great many varieties, some of them having upon them natural representations of men and different kinds of animals, &c. Those representations are not confined to the agates whose ground is of any particular colour, but are occasionally found on all the different species. Velschius had in his custody a flesh-coloured agate, on one side of which appeared a half-moon in great perfection, represented by a milky semicircle; on the other side, the phases of *vesper*, or the evening star; whence he denominated it an *aphrodisian agate*. An agate is mentioned by Kircher,[1] on which was the representation of a heroine armed; and one in the church of St Mark in Venice has the representation of a king's head adorned with a diadem. On another, in the museum of the prince of Gonzaga, was represented the body of a man with all his clothes, in a running posture. A still more curious one is mentioned by De Boot,[2] wherein appears a circle struck in brown, as exactly as if done with a pair of compasses, and in the middle of the circle the exact figure of a bishop with a mitre on: but inverting the stone a little, another figure appears; and if it is turned yet farther, two others appear, the one of a man, and the other of a woman. But the most celebrated agate of this kind was that of Pyrrhus, wherein were represented the nine Muses, with their proper attributes, and Apollo in the middle playing on the harp.[3] We have also seen accounts of an oriental agate, of such size as to be fashioned into a cup, whose diameter is an ell abating two inches. In the cavity is found delineated in black specks, B. XRISTOR. S. XXX. Other agates have also been found, representing the numbers 4191, 191; whence they were called *arithmetical* agates, as those representing men or women have obtained the name of *anthropomorphous*.

Agates may be stained artificially with solution of silver in spirit of nitre, and afterwards exposing the part to the

[1] *Ephem. German.* dec. i. an. I. obs. 161.

[2] *De Gem.* l. ii. c. 95.

[3] *Pliny.* l. xxxvii. c. 3.

sun; and though these artificial colours disappear on laying the stone for a night in aquafortis, yet a knowledge of the practicability of thus staining agates must render these curious figures above mentioned strongly suspected of being the work, not of nature, but of art. Some account for these phenomena from natural causes. Thus Kircher, who had seen a stone of this kind in which were depicted the four letters usually inscribed on crucifixes, I. N. R. I. apprehends that some real crucifix had been buried under ground, among stones and other rubbish, where the inscription happening to be parted from the cross, and to be received among a soft mould or clay susceptible of the impression of the letters, came afterwards to be petrified. In the same manner he supposes the agate of Pyrrhus to have been formed. Others resolve much of the wonder into fancy.

The agate is used for making cups, rings, seals, handles for knives and forks, hilts for swords and hangers, beads to pray with, smelling-boxes, patch-boxes, &c. being cut or sawed with no great difficulty.

Agate, among *Antiquaries*, denotes a stone of this kind engraven by art. In this sense, agates make a species of antique gems, in the workmanship whereof we find eminent proofs of the great skill and dexterity of the sculptors. Several agates of exquisite beauty are preserved in the cabinets of the curious; but the facts or histories represented on these antique agates, however well executed, are now become so obscure, and their explications so difficult, that several diverting mistakes and disputes have arisen among those who undertook to give their true meaning.

Agate is also the name of an instrument used by gold-wire drawers; so called from the agate in the middle of it, which forms its principal part.

AGATHA, St, a market town on the Austrian principality of the Siebenbirgen, situated on the river Hartbache, with one Greek and one Lutheran church. The people are employed as coopers, shoemakers, and hosiers.

Agatha, *Santa*, a town on the banks of a small river in the province Calabria Ulteriore, in the kingdom of Naples, with a castle, and 1127 inhabitants.

AGATHIAS, or, as he calls himself in his epigrams, Agathius, distinguished by the title of *Scholasticus*, a Greek historian in the sixth century, in the reign of Justinian. He was born at Myrina, a colony of the ancient Æolians, in Asia the Less, at the mouth of the river Phythicus. He was an advocate at Smyrna. Though he had a taste for poetry, he was yet more famous for his history, which begins with the 26th year of Justinian's reign, where Procopius ends. It was printed in Greek and Latin by Vulcanius, at Leyden, 1594, in 4to; and at Paris, at the king's printing house, 1660, in folio.

AGATHO, the Athenian, a tragic and comic poet, was the disciple of Prodicus and Socrates, and applauded by Plato, in his Dialogues, for his virtue and beauty. His first tragedy obtained the prize; and he was crowned, in the presence of upwards of 30,000 persons, in the fourth year of the 90th Olympiad. There is nothing now extant of his works, excepting a few quotations in Aristotle, Athenæus, and others.

AGATHOCLES, the famous tyrant of Sicily, was the son of a potter at Reggio. He was a thief, a common soldier, a centurion, a general, and a pirate, all in regular succession. He defeated the Carthaginians several times in Sicily, and was once defeated himself. He first made himself tyrant of Syracuse, and then of all Sicily; after which he vanquished the Carthaginians again both in Sicily and Africa. But at length having ill success, and being in arrears with his soldiers, they mutinied, forced him to fly his camp, and cut the throats of his children, whom he left behind. Recovering himself, he relieved Corfu, besieged by Cassander; burnt the Macedonian fleet; and murdered the wives and children of those who had murdered his. Afterwards meeting with the soldiers themselves, he put them all to the sword; and ravaging the sea-coast of Italy, took the city of Hipponium. He was at length poisoned by his grandson Archagathus, in the 72d year of his age, 290 years before Christ, having reigned 28 years.

AGATHYRNA or Agathyrnum, Agathyrsa or Agathyrsum, in *Ancient Geography*, a town of Sicily, now *St Marco*, as old as the war of Troy, having been built by Agathyrnus, son of Æolus, on an eminence. The gentilitious name is *Agathyrnæus;* or, according to the Roman idiom, *Agathyrnensis.*

AGDE, a city of France, in the department of Herault. It is seated on the river Herault, a mile and a quarter from its mouth, where it falls into the Gulf of Lyons, and where there is a fort built to guard its entrance. The greater part of the inhabitants are merchants or seamen. The city is extended along the river, where it forms a little port wherein small craft may enter.

AGE, in the most general sense of the word, signifies the duration of any being, from its first coming into existence to the time of speaking of it, if it still continues; or to its destruction, if it has ceased to exist some time before we happen to mention it.

Among the ancient poets this word was used for the space of 30 years; in which sense *age* amounts to much the same with *generation.* Thus, Nestor is said to have lived *three ages* when he was 90 years old. By ancient Greek historians, the time elapsed since the beginning of the world is divided into three periods, which they call *ages.* The first reaches from the creation to the deluge which happened in Greece during the reign of Ogyges: this they call the *obscure* or *uncertain* age, because the history of mankind is altogether uncertain during that period. The second they call the *fabulous* or *heroic* age, because it is the period in which the fabulous exploits of their gods and heroes are said to have been performed. It began with the Ogygian deluge, and continued to the first Olympiad, when the third or *historical* age commenced. This division, however, it must be observed, holds good only with regard to the Greeks and Romans, who had no histories earlier than the first Olympiad. The Jews, Egyptians, Phœnicians, and Chaldees, not to mention the Indians and Chinese, who pretend to much higher antiquity, are not included in it.

The interval since the first formation of man has been divided by the poets into four *ages*, distinguished by the epithets of *golden, silver, brazen,* and *iron.* During the *golden* age, Saturn reigned in heaven, and justice and innocence in this lower world. The earth then yielded her productions without culture; men held all things in common, and lived in perfect friendship. This period is supposed to have lasted till the expulsion of Saturn from his kingdom. The *silver* age commenced when men began to deviate from the paths of virtue, and, in consequence of this deviation, their lives became less happy. The *brazen* age commenced on a further deviation; and the *iron* age took place in consequence of one still greater. A late author, however, reflecting on the barbarism of the first ages, will have the order which the poets assign to the four ages inverted; the first being a time of rudeness and ignorance, more properly denominated an *iron* than a *golden* age. When cities and states were founded, the *silver* age commenced; and since arts and sciences, navigation and commerce, have been cultivated, the *golden* age has taken place.

In some ancient northern monuments, the *rocky or stony* age corresponds to the *brazen* age of the Greeks. It is called *rocky*, on account of Noah's ark, which rested on Mount Ararat; whence men were said to be descended or sprung from mountains; or from Deucalion and Pyrrha restoring the race of mankind, by throwing stones over their heads. The northern poets also style the fourth age of the world the *ashen* age, from a Gothic king, Madenis or Mannus, who, on account of his great strength, was said to be made of ash, or because in his time people began to make use of weapons made of that wood.

Among the Jews, the duration of the world is also divided into three ages: 1. The *seculum inane*, or *void age*, was the space of time from the creation to Moses; 2. The *present age* denotes all the space of time from Moses to the coming of the Messiah; and 3. The *age to come* denotes the time from the coming of the Messiah to the end of the world.

Various other divisions of the duration of the world into *ages* have been made by historians. The Sibylline oracles, written, according to some, by Jews acquainted with the prophecies of the Old Testament, divide the duration of the world into ten *ages;* and according to Josephus, each age contained six hundred years. It appears, by Virgil's fourth eclogue, and other testimonies, that the age of Augustus was reputed the end of those ten *ages*, consequently as the period of the world's duration.

By some, the space of time commencing from Constantine, and ending with the taking of Constantinople by the Turks in the fifteenth century, is called the *middle age;* but others choose rather to date the middle age from the division of the empire made by Theodosius at the close of the fourth century, and extend it to the time of the emperor Maximilian I. in the beginning of the sixteenth century, when the empire was first divided into circles. The *middle* is by some denoted the *barbarous* age, and the latter part of it the *lowest* age. Some divide it into the *non-academical* and *academical* ages. The first includes the space of time from the sixth to the ninth century, during which schools or academies were lost in Europe; the second, from the ninth century, when schools were restored, and universities established, chiefly by the care of Charlemagne.

The several *ages* of the world may be reduced to three grand epochs, viz. the *age* of the law of nature, called by the Jews the *void age*, from Adam to Moses; the *age* of the Jewish law, from Moses to Christ; and the *age* of grace, from Christ to the present time.

Age is also frequently used in the same sense with *century*, to denominate a duration of 100 years.

Age likewise signifies a certain period of the duration of human life; by some divided into four stages, namely, infancy, youth, manhood, and old age; the first extending to the 15th year, the second to the 25th, the third to the 50th, and the fourth to the end of life; by others divided into infancy, childhood, youth, manhood, and old age.

Age, in *Law*, signifies a certain period of life when persons of both sexes are enabled to do certain acts. Thus, one at twelve years of age ought to take the oaths of allegiance to the king in a leet; at fourteen he may marry, choose his guardian, and claim his lands held in soccage. Twenty-one is called *full age*, a man or woman being then capable of acting for themselves, of managing their affairs, making contracts, disposing of their estates, and the like.

AGELNOTH, Egelnoth, or Æthelnoth, in Latin *Achelnotus*, archbishop of Canterbury in the reign of Canute the Great, succeeded Livingus in that see in the year 1020. This prelate, surnamed the *Good*, was son of Earl Agilmer, and at the time of his election, dean of Canterbury. After his promotion he went to Rome, and received his pall from Pope Benedict VIII. On his way thither, as he passed through Pavia, he purchased, for a hundred talents of silver and one of gold, St Augustin's arm, which was kept there as a relic, and sent it over to England as a present to Leofric, earl of Coventry. Upon his return, he is said to have raised the see of Canterbury to its former lustre. He was much in favour with King Canute, and employed his interest with that monarch to good purposes. It was by his advice that the king sent over large sums of money for the support of the foreign churches; and Malmesbury observes, that this prince was prompted to acts of piety, and restrained from excesses, by the regard he had for the archbishop. Agelnoth, after he had sat 17 years in the see of Canterbury, departed this life on the 29th of October 1038, and was succeeded by Eadsius, King Harold's chaplain. This archbishop was an author, having written, 1. A Panegyric on the blessed Virgin Mary; 2. A Letter to Earl Leofric concerning St Augustin; 3. Letters to several persons.

AGEMA, in *Macedonian Antiquity*, was a body of soldiers, not unlike the Roman legion.

AGEMOGLANS, Agiamoglans, or Azamoglans, in the *Turkish Polity*, are children purchased from the Tartars, or raised every third year, by way of tribute, from the Christians tolerated in the Turkish empire. These, after being circumcised and instructed in the religion and language of their tyrannical masters, are taught the exercises of war, till they are of a proper age for carrying arms; and from this corps the janizaries are recruited. With regard to those who are thought unfit for the army, they are employed in the lowest offices of the seraglio. Their appointments also are very small, not exceeding seven aspers and a half per day, which amount to about threepence halfpenny of our money.

AGEN, an arrondissement in the department of the Lot and Garonne, in the south-west of France, extending over 406 square miles, or 259,840 acres, containing 9 cantons and 93 communes, with 79,312 inhabitants. The chief city, of the same name, is situated on the left bank of the Garonne, and contains 10,800 inhabitants.

AGENDA, among philosophers and divines, signifies the duties which a man lies under an obligation to perform. Thus, we meet with the *agenda* of a Christian, or the duties he ought to perform; in opposition to the *credenda*, or things he is to believe.

Agenda, among merchants, a term sometimes used for a memorandum-book, in which is set down all the business to be transacted during the day, either at home or abroad.

Agenda, among ecclesiastical writers, denotes the service or office of the church. We meet with *agenda matutina et vespertina*, the morning and evening prayers; *agenda diei*, the office of the day, whether feast or fast; *agenda mortuorum*, called also simply *agenda*, the service of the dead.

Agenda is also applied to certain church-books, compiled by public authority, prescribing the order and manner to be observed by the ministers and people in the principal ceremonies and devotions of the church; in which sense *agenda* amounts to the same with what is otherwise called *ritual, liturgy, acalouthia, missal, formulary, directory*, &c.

AGENHINE, in our old writers, signifies a guest that has lodged at an inn for three nights, after which time he was accounted one of the family; and if he offended the king's peace, his host was answerable for him. It is also written Hogenhine and Hogenhyne.

AGENOIS, a country of France, in the department of the Garonne, formerly the province of Guienne. It contains about one hundred and twenty square leagues, is fertile and healthful, and, according to Cæsar, was inhabited by the Nitiobriges. It constituted part of the kingdom of Aquitania; was held by the counts of Toulouse, and successively by the English and French.

AGENORIA, in *Mythology*, the goddess of courage and industry, as *Vacuna* was of indolence.

AGENT, in a general sense, denotes any active power or cause. Agents are either natural or moral. Natural agents are such inanimate bodies as have a power to act upon other bodies in a certain and determinate manner; as gravity, fire, &c. Moral agents, on the contrary, are rational creatures, capable of regulating their actions by a certain rule.

AGENT is also used to denote a person intrusted with the management of an affair, whether belonging to a society, company, or private person.

AGENTES in Rebus, one of the ranks of officers in the court of the Constantinopolitan emperors, whose business was to collect and convey the corn both for the army and household; to carry letters and messages from court to all parts of the empire; to regulate couriers and their vehicles; to make frequent journeys and expeditions through the provinces, in order to inspect any motions, disturbances, or machinations tending that way, and to give early notice thereof to the emperor.

The *agentes in rebus* are by some made synonymous with our post-masters, but their functions were of great extent. They correspond to what the Greeks call *αγγαροφοροι*, and the Latins *veredarii*.

AGER, in *Roman Antiquity*, a certain portion of land allowed to each citizen.

AGER PICENUS, or PICENUM, in *Ancient Geography*, a territory of Italy, to the south-east of Umbria, reaching from the Appennines to the Adriatic. The people are called *Picentes* (Cicero, Livy), distinct from the Picentini on the Tuscan Sea, though called by Greek writers *Πικεντινοι*. This name is said to be derived from the bird *picus*, under whose conduct they removed from the Sabines, of whom they were a colony.

AGESILAUS, king of the Lacedemonians, the son of Archidamus, was raised to the throne in opposition to the superior claim of his nephew Leotychides. As soon as he came to the throne, he advised the Lacedemonians to anticipate the king of Persia, who was making great preparations for war, and to attack him in his own dominions. He was himself chosen for this expedition, and gained so many advantages over the enemy, that if the league which the Athenians and the Thebans formed against the Lacedemonians had not obliged him to return home, he would have carried his victorious arms into the very heart of the Persian empire. He gave up, however, all these triumphs readily, to come to the succour of his country, which he happily relieved by his victory over the allies in Bœotia. He obtained another near Corinth; but, to his great mortification, the Thebans afterwards gained several over the Lacedemonians. These misfortunes at first raised a clamour against him. He had been sick during the first advantages which the enemy gained; but as soon as he was able to act in person, his valour and prudence prevented the Thebans from reaping the advantages of their victories; so that it was generally believed, had he been in health at the beginning, the Lacedemonians would have sustained no losses, and that all would have been lost had it not been for his assistance. It cannot be denied but he loved war more than the interest of his country required; for if he could have lived in peace, he would have saved the Lacedemonians several losses, and they would not have been engaged in many enterprises which in the end contributed much to weaken their power. He died in the third year of the 104th Olympiad, being the 84th year of his age and 41st of his reign, and was succeeded by his son Archidamus. Agesilaus would never suffer any picture or sculpture to be made of him, and prohibited it also by his will. This he is supposed to have done from a consciousness of his own deformity; for he was of a short stature, and lame of one foot, so that strangers used to despise him at the first sight. Agesilaus was extremely fond of his children, and would often amuse himself by joining in their diversions. One day when he was surprised riding upon a stick with them, he said to a person who had seen him in this posture, "Forbear talking of it till you are a father."

AGGA, or AGGONNA, a British settlement on the Gold Coast of Guinea. It is situated under the meridian of London, in lat. 6. N.

AGGER, in the ancient military art, a work of fortification, used both for the defence and the attack of towns, camps, &c.; in which sense it is the same with what was otherwise called *vallum*, and in later times *aggestum*; and, among the moderns, *lines*, sometimes *cavaliers*, *terrasses*, &c. The agger was usually a bank or elevation of earth or other matter, bound and supported with timber; having sometimes turrets on the top, wherein the workmen, engineers, and soldiery, were placed. It was also accompanied with a ditch, which served as its chief defence.

The height of the agger was frequently equal to that of the wall of the place. Cæsar tells us of one he made which was 30 feet high and 330 feet broad. Besides the use of aggers before towns, the generals used to fortify their camps with such works.

AGGER, in ancient writers, likewise denotes the middle part of a military road, raised into a ridge, with a gentle slope on either side, to make a drain for the water, and keep the way dry.—The term is also used for the whole road or military way. Where highways were to be made in low grounds, as between two hills, the Romans used to raise them above the adjacent land, so as to make them of a level with the hills. These banks they called *aggeres*. Bergier mentions several in Gallia Belgica, which were thus raised, ten, fifteen, or twenty feet above ground.

AGGERHUUS, one of the four provinces or sees into which the kingdom of Norway is divided. It extends over 32,790 square miles, with a population of no more than 394,605 inhabitants. It is a very mountainous but most romantic district, abounding in woods, rivers, cascades, and lakes, with some moderately fruitful spots in the narrow valleys. The climate is raw and cold, and the frosts usually continue till May. The corn is scarcely sufficient for the consumption, though fish and potatoes are extensively used as food. The chief trade is in deals, pitch, and tar, with some iron, butter, tallow, and hides. The inhabitants all speak the peculiar language of Norway, a dialect of the Teutonic mixed with the Celtic; and are all of the Lutheran confession, and have 307 parish churches and chapels.

AGGERHUUS, a bailiwick in the see of the same name, in Norway. It is in the middle of the see, near the lake of Christiana, and comprehends 2 cities, 5 market towns, 22 parishes, and 67,808 inhabitants.

AGGERS-HERRED, a district of Christiansand and a diocese of Norway. It consists of three juridical places; namely, Ascher, West Barm, and Agger.

AGGLUTINANTS, in *Pharmacy*, a general name for all medicines of a glutinous or viscid nature; which, by adhering to the solids, were supposed to contribute to repair their loss.

AGGREGATION, in *Physics*, a species of union, whereby several things which have no natural dependence or connection with one another are collected together, so as in some sense to constitute one. Thus, a heap of sand, or a mass of ruins, is a body by aggregation.

AGHER, a town of Ireland, situated in the southern part of Ulster, not far from Clogher.

AGHRIM, a town of Ireland, in the county of Wicklow and province of Leinster, situated about 31 miles south-west of Wicklow.

Aghrim, in Galway, a small village, distant about 32 miles from Dublin, and rendered memorable by a decisive battle fought there and at Kilcommodon-hill on the 12th of July 1691, between General Ginkle and Monsieur St Ruth, the commanders under King William III. and James II.; when St Ruth, the general of the Irish army, with 7000 of his men, was slain, but of the English only 600. The victory was the more considerable, as the English army consisted of no more than 18,000 men; whereas the Irish were computed at 20,000 foot and 5000 horse and dragoons. They lost likewise nine pieces of brass cannon; all their ammunition, tents, and baggage; and most of their small arms, which they threw away to expedite their flight; with 11 standards, and 32 pairs of colours.

AGILITY, an aptitude of the several parts of the body to motion. The improving of agility was one of the chief objects of the institution of games and exercises. The athletæ made particular profession of the science of cultivating and improving agility. Agility of body is often supposed peculiar to some people; yet it seems less owing to any thing peculiar in their frame and structure, than to practice.

AGINCOURT, a village of the French Netherlands, situated in N. lat. 50. 35. E. long. 2. 10. famous on account of the victory obtained by Henry V. of England over the French.

On the morning of Friday the memorable 25th of October, A. D. 1415, the day of Crispin and Crispianus, the English and French armies were ranged in order of battle, each in three lines, with bodies of cavalry on each wing. The constable D'Albert, who commanded the French army, fell into the snare that was laid for him, by drawing up his army in the narrow plain between the two woods. This deprived him, in a great measure, of the advantage he should have derived from the prodigious superiority of his numbers; obliged him to make his lines unnecessarily deep, about 30 men in file; to crowd his troops, particularly his cavalry, so close together, that they could hardly move or use their arms; and, in a word, was the chief cause of all the disasters that followed. The French, it is said, had a considerable number of cannon of different sizes in the field; but we do not hear that they did any execution, probably for want of room. The first line of the French army, which consisted of 8000 men-at-arms on foot, mixed with 4000 archers, with 500 men-at-arms mounted on each wing, was commanded by the constable D'Albert, the dukes of Orleans and Bourbon, and many other nobles; the dukes of Alençon, Brabant, and Bar, &c. conducted the second line; and the earls of Marle, Damartine, Fauconberg, &c. were at the head of the third line. The king of England employed various arts to supply his defect of numbers. He placed 200 of his best archers in ambush, in a low meadow, on the flank of the first line of the French. His own first line consisted wholly of archers, four in file; each of whom, besides his bow and arrows, had a battle-axe, a sword, and a stake pointed with iron at both ends, which he fixed before him in the ground, the point inclining outwards, to protect him from cavalry. This was a new invention, and had a happy effect. That he might not be encumbered, he dismissed all his prisoners on their word of honour to surrender themselves at Calais if he obtained the victory, and lodged all his baggage in the village of Agincourt, in his rear, under a slender guard. The command of the first line was, at his earnest request, committed to Edward duke of York, assisted by the lords Beaumont, Willoughby, and Fanhope; the second was conducted by the king, with his youngest brother Humphrey duke of Gloucester, the earls of Oxford, Marshal, and Suffolk; and the third was led by the duke of Exeter, the king's uncle. The lines being formed, the king, in shining armour, with a crown of gold adorned with precious stones on his helmet, mounted on a fine white horse, rode along them, and addressed each corps with a cheerful countenance and animating speeches. To inflame their resentment against their enemies, he told them that the French had determined to cut off three fingers of the right hand of every prisoner; and to rouse their love of honour, he declared, that every soldier in that army who behaved well should from henceforth be deemed a gentleman, and entitled to bear coat armour.

When the two armies were drawn up in this manner, they stood a considerable time gazing at one another in solemn silence. But the king, dreading that the French would discover the danger of their situation, and decline a battle, commanded the charge to be sounded, about ten o'clock in the forenoon. At that instant the first line of the English kneeled down and kissed the ground; and then starting up, discharged a flight of arrows, which did great execution among the crowded ranks of the French. Immediately after, upon a signal being given, the archers in ambush arose, and discharged their arrows on the flank of the French line, and threw it into some disorder. The battle now became general, and raged with uncommon fury. The English archers, having expended all their arrows, threw away their bows, and rushing forward, made dreadful havock with their swords and battle-axes. The first line of the enemy was by these means defeated, its leaders being either killed or taken prisoners. The second line, commanded by the duke D'Alençon (who had made a vow either to kill or take the king of England, or to perish in the attempt), now advanced to the charge, and was encountered by the second line of the English, conducted by the king. This conflict was more close and furious than the former. The duke of Gloucester, wounded and unhorsed, was protected by his royal brother till he was carried off the field. The duke D'Alençon forced his way to the king, and assaulted him with great fury; but that prince brought him to the ground, where he was instantly dispatched. Discouraged by this disaster, the second line made no more resistance, and the third fled without striking a blow; yielding a complete and glorious victory to the English, after a violent struggle of three hours' duration.

AGIO, in *Commerce*, is a term chiefly used in Holland, and at Venice, to signify the difference between the value of bank stock and the current coin.

AGIOSYMANDRUM, a wooden instrument used by the Greek and other churches, under the dominion of the Turks, to call together assemblies of the people. The *agiosymandrum* was introduced in the place of bells, which the Turks prohibited their Christian subjects the use of, lest they should make them subservient to sedition.

AGIS, king of Lacedemon, was descended from Agesilaus II. in a right line. He projected the reformation of his kingdom, by the restoring of the laws of Lycurgus;

but he fell under the weight of an enterprise that could not but be disagreeable to all those who had great possessions, and had been long accustomed to the sweets of a voluptuous life. Agis, being in the flower of his age, and having a very refined desire of glory, practised the ancient discipline first in his own person. His clothes and his table were according to the manners of former times; which is so much the more to be admired, because Agesistrata, his mother, and Archidamia, his grandmother, had brought him up voluptuously. When he sounded the people's minds, he found that the younger sort opposed his project less than those who had enjoyed a relaxation of discipline several years. The greatest difficulty was expected to arise from the women. They had at that time more credit than ever; for their power is never greater than when luxury is in fashion. Agis's mother did not at all relish the proposed reformation. She must have lost her riches, which gave her a share in a thousand sorts of intrigues; so she opposed the design at once, and treated it as a chimera. But her brother Agesilaus, whom Agis had engaged in his interests, knew how to manage her in such a manner, that she promised to second the enterprise. She endeavoured to gain the women; but instead of suffering themselves to be persuaded, they applied to Leonidas, the other king of Lacedemon, and humbly besought him to frustrate the designs of his colleague. Leonidas durst not oppose it openly, for fear of irritating the people, to whom the reformation was agreeable, because they found their account in it. He contented himself with countermining it by intrigues, and sowing suspicions as if Agis had aspired to tyranny, by pulling down the rich and raising the poor. Agis did not fail to propose his new laws to the senate, relating to the discharge of debts, and a new division of the lands. Leonidas, being supported by the rich, opposed this project so strongly that there was one voice more against it than for it. He paid dear for his success in this affair. Lysander, one of the ephori, who had been the grand promoter of the reformation, caused certain accusations to be preferred against him; using, at the same time, some expedients to make him an object of superstitious dislike. Leonidas, being frightened, took refuge in the temple of Minerva. He was summoned, and because he did not appear, he was degraded from his dignity, which was conferred on his son-in-law Cleombrotus. He obtained leave to retire to Tegæa. The new ephori had Lysander and Mandroclidas tried for innovation: these persuaded the two kings to unite and turn out these ephori. The thing was brought about, but not without a great tumult in the city. Agesilaus, one of the ephori that succeeded those that were just turned out, would have caused Leonidas to be killed on the way to Tegæa, if Agis had not sent him a strong guard. The reformation might then have been established, if Agesilaus had not found means to elude the good intentions of the two kings. Whilst this was transacting, the Achaians asked assistance, which was given them; and Agis had the command of the troops. He acquired a good deal of reputation in this campaign. At his return, he found his affairs so embroiled by the ill conduct of Agesilaus, that it was impossible for him to maintain himself. Leonidas was recalled to Lacedemon: Agis retired into one temple, and Cleombrotus into another. The wife of the latter behaved herself in such a manner that she became the admiration of every body. Leonidas was contented with banishing his son-in-law; after which he applied himself entirely to the ruin of Agis. One of the ephori, who had no mind to return what Agesistrata, the mother of Agis, had lent him, was the principal instrument of the misfortune of this family. Agis never went out of his sanctuary but to bathe. One day, as he was returning from thence to the temple, he was seized by that ephorus and carried to prison. Then he was brought to his trial, condemned to death, and delivered to the executioner. His mother and grandmother used all the entreaty and importunity imaginable, that, as he was king of Lacedemon, he might at least be permitted to plead his cause before the people. But they were apprehensive lest his words would make too great an impression, and therefore they ordered him to be strangled that very hour. The ephorus who was in debt to Agesistrata permitted that princess to go into the prison; which he granted likewise to Agis's grandmother: but he gave orders to strangle them one after another. Agesistrata died in a manner that was extremely to her honour. The wife of Agis, who was a princess of great fortune and prudence, was forced away from her apartment by King Leonidas, and obliged to marry his son Cleomenes, who was then very young.

AGISTMENT, AGISTAGE, or AGISTATION, in *Law*, the taking in of other people's cattle to graze at so much per week. The term is peculiarly used for the taking of cattle to feed in the king's forests, as well as for the profits arising from that practice. It is also used, in a metaphorical sense, for any tax, burden, or charge; thus, the tax levied for repairing the banks of Romney Marsh was called *agistamentum*.

AGISTOR or AGISTATOR, an officer belonging to forests, who has the care of cattle taken in to be grazed, and levies the moneys due on that account. They are generally called *quest-takers* or *gift-takers*, and are created by letters patent. Each royal forest has four agistors.

AGITATION, the act of shaking a body, or tossing it backwards and forwards.

AGITATION, in *Physic*, is often used for an intestine commotion of the parts of a natural body. Fermentation and effervescence are attended with a brisk agitation of the particles.

AGITATION is one of the chief causes or instruments of mixtion; by the agitation of the parts of the blood and chyle, in their continual circulation, sanguification is in a good measure effected. Butter is made out of milk by the same means; in which operation a separation is made of the oleous parts from the serous, and a conjunction of the oleous together. Digestion itself is only supposed to be an insensible kind of agitation.

AGITATION is reputed one of the symptoms of inspiration. Petit informs us,[1] that in the last century there arose in a church of Italy, for the space of a year, a vapour of an extraordinary kind, which put all the people into trembling and agitations, and, unless they got away betimes, set them a dancing, with strange contortions and gesticulations. This seems to verify what has been related of the temple of Delphi.

AGITATOR, in *Antiquity*, a term sometimes used for a charioteer, especially those who drove in the circus at the curule games.

AGITATORS, in *English History*, certain officers set up in the army in 1647, to take care of its interests. Cromwell joined the agitators, only with a view to serve his own ends; which being once accomplished, he found means to get them abolished.

AGLAIA, the name of the youngest of the three Graces, espoused to Vulcan.

AGLAR or AQUILEJA, a city of Austria, in the government of Laybach and Trieste, in the district of Quino. It was in ancient times of great extent and celebrity, but now contains only 1420 inhabitants. It is situated in a swampy spot on the banks of the river Anfora, and is very unhealthful. Long. 13. 28. 32. E. Lat. 45. 32. N.

[1] Petit. *De Sibylla*, l. i. *Nouv. Rep. Lett.* tom. viii. p. 1113.

AGLIONBY, John, an English divine, chaplain in ordinary to King James I., was born in Cumberland, and admitted a student at Oxford in 1583. He was a man of universal learning, and had a very considerable hand in the translation of the New Testament appointed by King James I. in 1604. He died in 1609.

AGMEN, in *Antiquity*, properly denotes a Roman army in march; in which sense it stands contradistinguished from *acies*, which denoted the army in battle array; though, on some occasions, we find the two words used indifferently for each other. The Roman armies, in their marches, were divided into *primum agmen*, answering to our van-guard; *medium agmen*, our main-guard; and *postremum agmen*, the rear-guard. The order of their march was thus: after the first signal with the trumpets, &c. the tents were taken down, and the baggage packed up; at the second signal the baggage was to be loaded on the horses and carriages, and at the third signal they were to begin their march. First came the *extraordinarii*; then the auxiliaries of the first wing, with their baggage; and these were followed by the legions. The cavalry marched either on each side or behind.

AGNATE, in *Law*, any male relation by the father's side.

AGNEL, an ancient French gold coin, first struck under the reign of St Louis, worth about twelve sols six deniers. The agnel is also called sometimes *mouton d'or*, and *agnel d'or*. The denomination is supposed to have arisen from the figure of a lamb (*agnus*) or sheep, struck on one side.

AGNES, St, a large mining village in the county of Cornwall, 168 miles from London, and five from Truro. It is on a small rocky harbour, only accessible to fishing boats, on the Bristol Channel. It contained, in 1811, 4960 inhabitants; in 1821, 5762; and in 1831, 6642. It is also the name of one of the Scilly Islands, on the coast of Cornwall. The soil is fertile, and tolerably cultivated; but there is a great deficiency of water. A light-house on the island, about 50 feet in height, built on one of the loftiest hills, is an important object to seamen. Its exact position, as ascertained by the great trigonometrical survey, is in long. 6. 19. 23. W. and lat. 49. 53. 38. N. from Greenwich. The light is composed of Argand lamps, with reflectors, moving in a circular revolution, and presenting a bright and conspicuous light in every direction once a minute. To the westward of St Agnes is the Gillstone rock, on which Sir Cloudesley Shovel was lost in the Association ship of war in 1707.

AGNESI, Maria Gaetana, an Italian lady, who may be justly pronounced one of the greatest wonders and ornaments of her sex, was born at Milan, on the 16th of May 1718. Our materials for an account of this celebrated female are by no means so complete, nor in some interesting particulars so distinct, as we could have wished. Not having been able to procure her Eloge by *Frisi*,[1] we have been obliged to content ourselves with some shorter notices, the most detailed of which is that contained in Mazzuchelli's *History of the Writers of Italy*, a work published during the earlier but more brilliant period of her life. The accounts which this writer and some others have given of the intellectual capacities and endowments which she displayed in early youth, call to mind the wonders which have been related of Picus of Mirandula and the Admirable Crichton; nor does there seem any reason to doubt their authenticity. At nine years of age she not only spoke the Latin language with precision, but even composed and delivered an oration in that language, intended to prove that the cultivation of letters is not incompatible with the female character. This singular piece was published at Milan the same year in which it was spoken, with the following title: *Oratio, qua ostenditur artium liberalium studia a fœmineo sexu neutiquam abhorrere, habita a Maria de Agnesiis, rhetoricæ operam dante, anno ætatis suæ nono nondum exacto, die* 18 *Augusti* 1727.

At eleven years of age she spoke Greek with all the fluency of her native tongue. When yet very young, she had also acquired some of the languages of the East; and, in a word, her acquisitions as a linguist were such as to procure for her the appellation of a *Walking Polyglot*. But her aptitude for acquiring languages, however great, was by no means the only, or the most striking feature of her intellectual character. We have seen how early she essayed the discussion of a general question affecting the mental capacities of her sex; and the vigour and acuteness displayed in this aspiring essay were, ere long, exerted with ardour and success in scientific inquiries. Having gone through the elementary branches of mathematics, she proceeded with alacrity to the study of natural philosophy; and she seems also to have carried her researches into the obscurer regions of metaphysical speculation.

About the time when she reached her fifteenth year, her father formed a select assembly of the learned of Milan; and at these meetings, which were held in his house, at stated times, for several years, Agnesi maintained a succession of *Theses* on various points of speculation and philosophy. The ability which she displayed on these occasions seems to have been altogether surprising; and the effect was not the less, that her person was agreeable, and her whole deportment gentle and prepossessing. We are indebted to the learned president De Brosses for the following account of one of these conferences, at which he assisted during his travels in Italy, through the introduction of Count Belloni. "I had conceived," says he, "when I went to this *conversazione*, that it was only to talk with this young lady in the usual way, though on learned subjects; but to my surprise Belloni addressed her in a fine Latin harangue, with all the formality of an academic oration. She replied in the same language with promptness and ability; and they proceeded, still in Latin, to discuss the origin of fountains, and the causes of the ebbings and flowings observed in some of them. She spoke like an angel on this subject, and I never heard it treated so much to my satisfaction. We then discoursed with her concerning the manner in which the soul receives impressions from outward objects, and their conveyance to the general *sensorium*, the brain; and afterwards upon the propagation of light, and the prismatic colours. The conversation afterwards became general, every one speaking to her in the language of his own country, and she answering in the same." (*Lettres sur l'Italie*, tom. i. p. 243.) But Agnesi seems to have taken but little delight in the glory which she acquired as a philosophical disputant. Her temper was retired and devout, and she appears to have acted this part more to gratify her father than herself. About her twentieth year she accordingly withdrew from these assemblies, and for a long period devoted the greater part of her time to mathematical studies. The Theses which she had maintained with so much applause were published in a quarto volume, under the following title: *Propositiones Philosophicæ, quas crebris disputationibus domi habi-*

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[1] This Eloge has been translated into French by Boulard, and published both separately and at the end of a work entitled *Bienfaits de la Religion Chrétienne*, 1807, 2 vols. 8vo. See *Biographie Universelle*, tom. i.

tis coram clarissimis viris explicabat extempore, et ab objectis vindicabat, Maria Gaetana de Agnesiis, Mediolanensis. Med. 1738.

The first fruit of her mathematical studies was a Commentary on the *Conic Sections* of the Marquis de l'Hôpital; but this piece she would never consent to publish, though Mazzuchelli says that it was greatly praised by many who had perused the manuscript. In the course of a few years, however, she gave to the world a mathematical work, which must ever secure her a high rank among the most distinguished cultivators of abstract science. This work, entitled *Instituzioni Analitiche ad uso della Gioventu Italiana*, was published at Milan in 1748, in two volumes quarto. The first volume treats of the analysis of finite quantities; the second, of the analysis of infinitesimals. These two volumes contain a full and satisfactory view of this branch of mathematical science in the state at which it had then arrived; and though improvements have since that time been introduced, the treatise of Agnesi, according to a very competent authority, may still be regarded as perhaps the best introduction that is to be found to the works of Euler and the other mathematicians of the Continent. (*Edinb. Review*, vol. iii. p. 408.) An English translation of this work was long ago executed by the late Professor Colson of Cambridge; but the manuscript lay buried in obscurity for many years, and was only published in 1801, through the care and at the expense of Baron Maseres.

Besides other literary honours which followed the publication of the *Analytical Institutions*, Agnesi was, in 1750, appointed professor of mathematics and natural philosophy in the university of Bologna. The appointment of a young female, of thirty-two years of age, to such a charge, must appear to many as not a little singular; but the truth is, that female professors were by no means uncommon in Italy; and Lalande mentions several as having been eminent in the same university, one of whom was professor of anatomy. (*Voyage en Italie*, tom. ii.) Our scanty information does not enable us to state whether Agnesi ever entered upon the active duties of the mathematical chair. Though her life was long, we can add but little in regard to her after-history. She died, according to the meagre notice contained in the *Biographie Universelle*, in the year 1799. Her mistaken notions of religious duty rendered the greater part of her existence but a blank to the world. She had early expressed a wish to retire into a convent, and seems to have carried this design into effect not long after the period when her great work procured for her the honours to which we have just alluded. We afterwards hear of her only as a devoted sister of the austere order of *Blue Nuns*, repelling the approaches of those of the learned who still desired to converse with her, and thus exhibiting another melancholy instance of the inconsistencies of our nature, and the darkening power of superstition over the brightest minds. But she lived long enough for the world to vindicate the intellectual capacities of her sex,—to show that the female mind is not only fitted for the lighter exercises of literature, but capable also of fathoming the depths and unravelling the intricacies of abstract science. If there are any, therefore, whose speculations may have led them to more depreciating conclusions, let them, to use the words of a profound and eloquent writer already quoted in this article, "peruse the long series of demonstrations which the author of the *Analytical Institutions* has contrived with so much skill, and explained with such elegance and perspicuity: if they are able to do so, they will probably retract their former opinions; if unable, they will not of course see the reasons for admiring her genius that others do; but they may at least learn to think modestly of their own." (*Edinb. Rev.* vol. iii. p. 410.)

AGNO, a river of Naples, which, taking its rise in the mountains of Terra di Lavora, falls into the Mediterranean, about seven miles north of Puzzuoli.

AGNOETÆ (from *αγνοεω*, to be *ignorant of*), in church history, a sect of ancient heretics, who maintained that Christ, considered as to his human nature, was ignorant of certain things, and particularly of the time of the day of judgment. Eulogius, patriarch of Alexandria, ascribes this heresy to certain solitaries in the neighbourhood of Jerusalem, who built their opinion upon the text, Mark xiii. 32, "Of that day and hour knoweth no man, no not the angels who are in heaven, neither the Son, but the Father only." The same passage was made use of by the Arians; and hence the orthodox divines of those days were induced to give various explications thereof. Some allege that our Saviour here had no regard to his divine nature, but only spoke of his human. Others understand it thus: that the knowledge of the day of judgment does not concern our Saviour considered in his quality of Messiah, but of God.

AGNOMEN, in *Roman Antiquity*, a kind of fourth or honorary name, given to a person on account of some extraordinary action, virtue, or other accomplishments. Thus the agnomen *Africanus* was bestowed upon Publius Cornelius Scipio on account of his great achievements in Africa.—The agnomen was the third in order of the three Roman names: thus, in Marcus Tullius Cicero, Marcus is the prænomen, Tullius the nomen, and Cicero the *agnomen*.

AGNONE, a city at the foot of Monte Capraro, in the province Abruzzo Citeriore, in the kingdom of Naples, with 6000 inhabitants, who prepare many copper wares.

AGNUS DEI, in the church of Rome, a cake of wax stamped with the figure of a lamb supporting the banner of the cross. These being consecrated by the pope with great solemnity, and distributed among the people, are supposed to have great virtues; as, to preserve those who carry them worthily, and with faith, from all manner of accidents; to expel evil spirits, &c. The name literally signifies *Lamb of God;* this being supposed an image or representation of the Lamb of God who took away the sins of the world. They cover it up with a piece of stuff cut in the form of a heart, and carry it very devoutly in their processions.

AGNUS *Dei* is also a popular name for that part of the mass wherein the priest, striking his breast three times, rehearses, with a loud voice, a prayer beginning with the words *Agnus Dei.* It is said to have been first brought into the missal by Pope Sergius I.

AGOGE, among ancient musicians, a species of modulation, wherein the notes proceed by continuous degrees.

AGON, a town of Sweden, in the province of Gefleborgsland, with a good harbour in the Gulf of Finland.

AGON, among the ancients, implied any dispute or contest, whether it had regard to bodily exercises or the accomplishments of the mind; and therefore poets, musicians, painters, &c. had their agones, as well as the athletæ. Games of this kind were celebrated at most of the heathen festivals with great solemnity, either annually or at certain periods of years. Among the latter were celebrated at Athens, the *agon gymnicus*, the *agon Nemeus* instituted by the Argives in the 53d Olympiad, and the *agon Olympius* instituted by Hercules 430 years before the first Olympiad.—The Romans also, in imitation of the Greeks, instituted contests of this kind. The emperor Aurelian established one under the name of *agon solis*, the contest of the sun; Dioclesian another, which he called *agon capitolinus*, which was celebrated every fourth year, after the manner of the Olympic games. Hence the years, instead of *lustra*, are sometimes numbered by *agones*.

Agon also signified one of the ministers employed in the heathen sacrifices, and whose business it was to strike the victim. The name is supposed to have been derived from hence, that standing ready to give the stroke, he asked, *Agon' ?* or *Agone ?* Shall I strike?

AGONALES, an epithet given to the Salii.

AGONALIA, in *Roman Antiquity*, festivals celebrated in honour of Janus or the god Agonius, whom the Romans invoked before undertaking any affair of importance.

AGONALIS Circus, now *La Piazza Novona*, a long, large, beautiful street in the heart of Rome, adorned with fountains, and the obelisk of Caracalla, still retaining the form of that circus. The reason of the name *Agonalis* is either unknown or doubtful. . Ovid seems to derive it from the *agones*, or solemn games, there celebrated, supposed to have been the *Ludi Apollinares*, or *Actiaci*, instituted by Augustus; whence the circus was called *Apollinaris;* also *Alexandrinus*, from the emperor Alexander Severus, who either inclosed or repaired it.

AGONISMA, in *Antiquity*, denotes the prize given to the victor in any combat or dispute.

AGONISTARCHA, from *αγων*, *combat*, and *αρχος*, *chief*, in *Antiquity*, seems to have been much the same with *agonotheta;* though some suggest a difference, making it the office of the former to preside at and direct the private exercises of the athletæ, which they went through by way of practice, before they made their appearance on the public theatres or amphitheatres.

AGONISTICI, in *Church History*, a name given by Donatus to such of his disciples as he sent to fairs, markets, and other public places, to propagate his doctrine; for which reason they were also called *Circutores*, *Circelliones*, *Catropitæ*, *Coropitæ*, and at Rome *Montenses*. They were called *Agonistici*, from the Greek *αγων*, *combat*, in regard they were sent as it were to fight and subdue the people to their opinions.

AGONIUM, in *Roman Antiquity*, was used for the day on which the *rex sacrorum* sacrificed a victim, as well as for the place where the games were celebrated, otherwise called *agon*.

AGONOTHETA, or Agonothetes, in *Grecian Antiquity*, was the president or superintendent of the sacred games; who not only defrayed the expense attending them, but inspected the manners and discipline of the athletæ, and adjudged the prizes to the victors.

AGONYCLITÆ, or Agonyclites, in *Church History*, a sect of Christians, in the 7th century, who prayed always standing, as thinking it unlawful to kneel.

AGORÆUS, in *Heathen Antiquity*, an appellation given to such deities as had statues in the market-places; particularly Mercury, whose statue was to be seen in almost every public place.

AGORANOMUS, in *Grecian Antiquity*, a magistrate of Athens, who had the regulation of weights and measures, the prices of provisions, &c.—The *agoranomi*, at Athens, were ten in number, five belonging to the city, and as many to the Piræus; though others make them 15 in all, of whom they assign 10 to the city. To these a certain toll or tribute was paid by all who brought any thing to sell in the market.

AGORDO, a market town in the Austrian dominions, in Italy, with 1825 inhabitants. It is in the government of Venice, and in the delegation of Belluno, on the river Condevolo. In its vicinity are mines of copper, lead, sulphur, and vitriol, the preparation of which is the chief occupation of the people.

AGRA, a province of Hindostan, chiefly situated between the 25th and 28th degrees of N. lat. On the north it is bounded by the province of Delhi, on the south by that of Malwah, on the east by the provinces of Oude and Allahabad, and on the west by that of Ajmeer. It is estimated to be 250 miles in length, and in average breadth to be 180. The following are the principal geographical and political divisions:—1. Agra district; 2. the Doab; 3. the district of Etaweh; 4. the Furruckabad district; 5. Calpee, Gohud, and Gualior; 6. the Bhurtpoor territories; 7. Alvar or Machery; 8. the Alighur district.

This province has an unequal surface. To the north-east of the Jumna the country is flat and open, and rather bare of trees; but to the south of the Chumbul, and also towards the western frontier, it rises into hills, and is interspersed with jungle. Owing to the elevation of the ground, it has for the greater part of the year a temperate climate. In summer, while the hot winds prevail, it is intensely hot, and the climate is unhealthful, especially among the hills. But these winds do not continue for any length of time; and in the winter months it is actually cold, especially during the night. The province is indifferently watered. The chief rivers are the Jumna, the Chumbul, and the Ganges, besides other streams of inferior note. Except in the vicinity of the large rivers, water is scarce for the purposes of irrigation. Rice, which requires an abundant supply of moisture, is not cultivated. The soil is particularly adapted to the cultivation of indigo, cotton, and sugar, the production of which is annually increasing in the country under the jurisdiction of the British: in that which is still subject to the native chiefs, agriculture is in a backward state. There are no remarkable mineral productions in the province of Agra. The animals differ in no respect from those found in other parts of Hindostan and the breed of horses is much esteemed. The principal article manufactured is coarse cotton cloth; but no great quantity is exported. The most fertile part of the province is the Doab, or the territory included between the Ganges and the Jumna, which exports indigo, sugar, and cotton. The country to the north-west of Agra, which is under the dominion of the native chiefs, being scantily supplied with water, is of a very inferior quality, and comparatively unproductive. This province is not nearly so populous as Bengal, Jaupore, and the more flourishing parts of the British territory. It does not contain above six millions of inhabitants, of whom the greater proportion live under the British jurisdiction; the remainder under Scindia and others of the native princes. The chief towns, besides Agra, the capital, are Alvar or Aloor, the capital of a native rajah; Bhurtpoor, one of the strongest fortresses in India, which the British carried by storm in 1826; Deeg, another strong fortress; Mathura, Kanoje, Etaweh, Gualior, Gohud, Calpee, Narwar, and Furruckabad. The natives are in general a robust and handsome race of people, and consist of a mixture of Hindoos and Mahometans. The Hindoo religion and language are predominant, although the country has been subject to the Mahometans since the thirteenth century.

Agra, the capital of the preceding province, is situated on the south-west side of the Jumna, from the banks of which it extends upward in a vast semicircle. It is a large, old, and ruinous city, with little to attract attention beyond that picturesque confusion of houses, balconies, and projecting roofs, common to all Indian towns. The houses consist of several stories, and the streets are so narrow as scarcely to admit a palanquin. The greater part of this once flourishing city is now a heap of ruins, and uninhabited. It is still, however, estimated to contain 60,000 inhabitants; and as its commerce improves, which it is likely to do, from the facilities which it affords to the trade of western Hindostan, its population is likely to increase also. Since 1818, indeed, in consequence of the tranquillity of the neighbouring province of Rajpootana or Ajmeer, the produce of the customs has continued progressively to increase. It has a fort, which is very large and ancient, and is surrounded with high walls and towers of red stone, of the hardness and colour of jasper, which command some noble views of the city, its neighbourhood, and the windings of the Jumna. The fort has a ditch of great depth, and a double rampart, the inner one being of an enormous height, with bastions at regular distances. Agra is famed for some beautiful edifices, the most remarkable of which is the Jage-mahal, a tomb erected by the emperor Shah Jehan, to the memory of Begum Novr-jehan, his beloved wife. Bishop Heber mentions, that after all he had heard of this celebrated mausoleum, its beauty rather exceeded than fell short of his expectations. It is of white marble, and is placed on an elevated terrace of white and yellow marble, with four tall minarets of the same material rising at each of its angles. The interior, containing a central hall, in which are the tombs of the emperor and his wife, is remarkable for its exquisite finish; the pavement being laid with alternate squares of marble, and the walls, screens, and tombs, crowned with flowers and inscriptions executed in beautiful Mosaic of cornelian, lapis lazuli, and jasper. The general effect of the whole is solemn and impressive rather than gaudy. There is a tomb erected to another of the emperors, now used as a court of justice, which is a splendid edifice. Agra contains, besides, a beautiful mosque of white marble, carved with exquisite simplicity and elegance, and the palace, built by Acbar chiefly of the same material, and now used as warehouses, offices, and lodging-rooms for the garrison. At Secundra, a ruinous village about six miles from Agra, is the magnificent tomb of the emperor Acbar, which, Bishop Heber remarks, is the most splendid building in its way that he had seen in India.

Agra was greatly enlarged and embellished by Acbar, who made it his capital. The city, which was under the rule of Scindia, surrendered to the British army under Lord Lake in 1803. It was soon after made the seat of the civil establishment for the collection of the revenue and the administration of justice. The fortifications have been lately strengthened and improved. 137 miles travelling distance from Delhi. Long. 77. 58. E. Lat. 27. 11. N. (*Narrative of a Journey through the Upper Provinces of India, from Calcutta to Bombay*, 1824, 1825; by Reginald Heber, D. D. Bishop of Calcutta.—*A Geographical, Statistical, and Historical Description of Hindostan and the adjacent Countries*; by Walter Hamilton, Esq. 1820.) (*r*.)

AGRAM, or Zagrab, a palatinate in the Austrian province of Croatia. Its extent is 768 square miles, or 491,520 English acres. The inhabitants in 1829 were 392,190, all of the Catholic religion. It is subdivided into two circles, that of Agram and of St John; the latter of which comprehends no town. In the whole palatinate there are one city, two market towns, and 279 villages. The country is undulating, but with a range of hills towards the Warasdin frontier. It is watered by the Save and its tributary streams. The chief productions are corn, tobacco, wine, potashes, and cattle. It contains much wood and pasture land.

Agram, one of the circles into which the palatinate of the same name in Austrian Croatia is divided. It is likewise the name of the capital of the whole. The city of Agram, in long. 16. 10. 13. E. and lat. 45. 49. 2. N., contains 2000 houses and 17,266 inhabitants. It is the seat of a bishop, of the courts of justice, and of the several boards which direct the affairs of the province of Croatia. There is an academical institution with ten professors. It has no manufactures; but the Save being navigable to the city, most of the commerce of Croatia centres in it.

AGRAMONT, a Spanish town in the province of Catalonia, with 3000 inhabitants.

AGRARIAN Laws, among the Romans, those relating to the division and distribution of lands; of which there were a great number; but that called the *Agrarian Law*, by way of eminence, was published by Spurius Cassius, about the year of Rome 268, for dividing the conquered lands equally among all the citizens, and limiting the number of acres which each citizen might enjoy. For some learned and ingenious inquiries on this subject, see Niebuhr's *Roman History*.

AGREDA, a Spanish town in the province of Soria, containing six parish churches, four monasteries, 3200 inhabitants, 11 tanneries, and 26 potteries. Not far from this place rises the mountain of Moncayo.

AGRIA, called by the Germans *Eger*, is a strong town in Upper Hungary, situated on a river of the same name, and has a citadel called *Eriaw*. It was besieged by the Turks in 1552, with 70,000 men; but they lost 8000 in one day, and were obliged to raise the siege, though the garrison consisted only of 2000 Hungarians, assisted by the women, who performed wonders on this occasion. However, it was afterwards taken by Mahomet III. in 1596, but was retaken by the emperor in 1687; since which time it has continued under the dominion of the house of Austria. It is 47 miles north-east of Buda, and 55 south-west of Cassovia. Long. 20. 10. E. Lat. 48. 10. N.

AGRICOLA, Cnæus Julius, born at Frejus, in Provence, was in Vespasian's time made lieutenant to Vettius Bolanus in Britain; and upon his return was ranked by that emperor among the patricians, and made governor of Aquitania. This post he held for three years; and upon his return was chosen consul, and afterwards appointed governor of Britain, where he greatly distinguished himself. He reformed many abuses occasioned by the avarice or negligence of former governors, put a stop to extortion, and caused justice to be impartially administered. Vespasian dying about this time, his son Titus, knowing the great merit of Agricola, continued him in the government. In the spring he marched towards the north, where he made some new conquests, and ordered forts to be built for the Romans to winter in. He spent the following winter in concerting schemes to bring the Britons to conform to the Roman customs. He thought the best way of diverting them from rising and taking arms was to soften their rough manners, by proposing to them new kinds of pleasure, and inspiring them with a desire of imitating the Roman manners. Soon after this the country was adorned with magnificent temples, porticoes, baths, and many other fine buildings. The British nobles had at length their sons educated in learning; and they who before had the utmost aversion to the Roman language, now began to study it with great assiduity. They wore likewise the Roman habit; and, as Tacitus observes, they were brought to consider those things as marks of politeness, which were only so many badges of slavery. Agricola, in his third campaign, advanced as far as the Tweed; and in his fourth he subdued the nations betwixt the Tweed and the friths of Edinburgh and Clyde, into which the rivers Glotta and Bodotria discharge themselves; and here he built fortresses to shut up the nations yet unconquered. In his fifth he marched beyond the friths, where he made some new acquisitions, and fixed garrisons along the western coasts, over against Ireland. In his sixth campaign he passed the river Bodotria; ordering his fleet, the first which the Romans ever had in those parts, to row along the coasts, and take a view of the northern parts. In the following spring, the Britons raised an army of 30,000 men; and the command was given to Galgacus, who, according to Tacitus, made an excellent speech to his countrymen on this occasion. Agricola likewise addressed his men in very strong and eloquent terms. The Romans gained the victory, and 10,000 of the Britons are said to have been killed. This happened in the reign of the emperor Domitian, who, growing jealous of the glory of Agricola, recalled him, under pretence of making him governor of Syria. Agricola died soon after; and his death is suspected to have been occasioned by poison given him by that emperor. Tacitus the historian married his daughter, wrote his life, and laments his death in the most pathetic manner.

Agricola, *George*, a German physician, famous for his skill in metals. He was born at Glaucha, in Misnia, on the 24th of March 1494. The discoveries which he made in the mountains of Bohemia gave him so great a desire of examining accurately into every thing relating to metals, that though he had engaged in the practice of physic at Joachimstal by advice of his friends, he still prosecuted his study of fossils with great assiduity, and at length removed to Chemnitz, where he entirely devoted himself to this study. He spent in pursuit of it the pension he had from Maurice duke of Saxony, and part of his own estate; so that he reaped more reputation than profit from his labours. He wrote several pieces upon this and other subjects; and died at Chemnitz on the 21st of November 1555, a very firm Papist. In his younger years he seemed not averse to the Protestant doctrine; and he highly disapproved of the scandalous traffic of indulgences, and several other things in the church of Rome. In the latter part of his life, however, he attacked the Protestant religion, which rendered him so odious to the Lutherans, that they suffered his body to remain unburied for five days. It was then removed from Chemnitz to Zeitz, where it was interred in the principal church.

Agricola, *John*, a Saxon divine, born at Eisleben in 1492. He went as chaplain to Count Mansfeld, when that nobleman attended the elector of Saxony to the diet at Spire in 1526, and that of Augsburg in 1530. He was of a restless, ambitious temper, rivalled and wrote against Melanchthon, and gave Count Mansfeld occasion to reproach him severely. He obtained a professorship at Wittemberg, where he taught particular doctrines, and became founder of the sect of Antinomians; which occasioned warm disputes between him and Luther, who had before been his very good friend. But though he was never able to recover the favour either of the elector of Saxony or of Luther, he received some consolation from the fame he acquired at Berlin, where he became preacher at court; and was chosen, in 1548, in conjunction with Julius Phlug and Michael Heldingus, to compose the famous *Interim*, which made so much noise in the world. He died at Berlin in 1566.

AGRICULTURE.

It is our principal object in this article to lay before our readers a view of the present state of British agriculture, particularly as the art is practised in our best cultivated counties. Much of what we shall state is derived from our own experience and observation; but we shall nevertheless be careful, on all matters of importance, to refer to the most approved authorities.

It is sufficiently evident that the culture of the soil must have somewhat preceded, and always kept pace with, the increase of population. When we read of the large armies brought into the field in the early ages, and the great number of inhabitants which some of the ancient cities are said to have contained, we must necessarily conclude that the labours of agriculture were conducted with skill, and that its produce was abundant. A considerable population may, no doubt, subsist upon a rich soil, even in a very rude state of the art, drawing from it only the supply of their own wants; but if much of the cultivator's time be required in the service of the public, and still more, if he has to provide for the subsistence and the luxury of large cities, he can obtain the necessary surplus produce only by successive improvements in his art. Not only his gross produce, but his net disposable produce, must be proportionally increased.

But of the rural economy even of the most civilized nations of antiquity, we are almost wholly ignorant. From the age of Moses, almost down to the commencement of the Christian era, though something may be gleaned from incidental notices in the Scriptures, and in the writings of a few ancient authors, we are quite unacquainted with the means by which food was obtained from the soil to support the rapid increase of mankind; especially when we find it accumulated on spots which seem to have been always naturally unproductive. We ought, perhaps, to except the Works and Days of Hesiod, who lived in the tenth century before our era, and who has described at some length the labours and the products of the agriculture of Greece at that early period. His work contains almost all the information we possess respecting the rural economy of that celebrated people.

Agriculture of the Romans.

Among the Romans this art seems to have obtained a high degree of improvement. It was practised by the rich and the great, and described by their poets and historians, several of whose works have reached our own times. These must be familiar to the classical scholar, and have been rendered accessible to all by Dickson, in his *Husbandry of the Ancients*, and other writers. We need therefore only mention the names of Cato, Varro, Virgil, Columella, Pliny, and Palladius, in the order in which they wrote. The treatises *De Re Rustica* of Varro and Columella are the most complete; but none of the Roman writers enables us to trace the rise and progress of agriculture, either in Italy or in any other country under their dominion. The most useful lesson they convey to the present age, perhaps, is the importance of attending to minute details, which their greatest names did not consider beneath their notice in the best period of their history.

Agriculture of the feudal times.

From the fall of the Roman empire till the revival of learning in the fifteenth century, little is known of the state of agriculture in any part of Europe. The historians of the period were too much occupied in recording military achievements, and with the rude policy and intestine broils of their respective countries, to give much attention to the peaceful, and at that time degraded, labours of the husbandman. The policy of the feudal system, the distribution of society which it occasioned, and the perpetual dissensions and petty hostilities which it engendered, furnish the best evidence of the low state of an art which can flourish only under the protection of law, and be carried on with success only by the energy of free men. But, during this long interval, the population of Europe was divided into two great classes, of which by far the larger one was composed of bondmen, without property, or the power of acquiring it, and small tenants, very little superior to bondmen; and the other class, consisting chiefly of the great barons and their retainers, was more frequently employed in laying waste the fields of their rivals, than in improving their own. The superstition of the times, which destined a large portion of the country to the support of the church, and which, in some measure, secured it from predatory incursions, was the principal source of what little skill and industry were then displayed in the cultivation of the soil. "If we consider the ancient state of Europe," says Mr Hume,[1] "we shall find, that the far greater part of society were everywhere bereaved of their personal liberty, and lived entirely at the will of their masters. Every one that was not noble was a slave; the peasants were not in a better condition; even the gentry themselves were subjected to a long train of subordination under the greater barons, or chief vassals of the crown, who, though seemingly placed in a high state of splendour, yet, having but a slender protection from law, were exposed to every tempest of the state, and, by the precarious condition on which they lived, paid dearly for the power of oppressing and tyrannizing over their inferiors."—"The villains were entirely occupied in the cultivation of their master's land, and paid their rents either in corn or cattle, and other produce of the farm, or in servile offices, which they performed about the baron's family, and upon farms which he retained in his own possession. In proportion as agriculture improved and money increased, it was found that these services, though extremely burdensome to the villain, were of little advantage to the master; and that the produce of a large estate could be much more conveniently disposed of by the peasants themselves, who raised it, than by the landlord or his bailiff, who were formerly accustomed to receive it. A commutation was therefore made of rents for services, and of money-rents for those in kind; and as men in a subsequent age discovered that farms were better cultivated where the farmer enjoyed security in his possession, the practice of granting leases to the peasant began to prevail, which entirely broke the bonds of servitude, already much relaxed from the former practices. The latest laws which we find in England for enforcing or regulating this species of servitude were enacted in the reign of Henry VII. And though the ancient statutes on this subject remain still unrepealed by Parliament, it appears, that before the end of Elizabeth, the distinction between villain and freeman was totally, though insensibly, abolished; and that no person remained in the state to whom the former laws could be applied."

Leases during the middle ages.

But, long before the fifteenth century, it is certain that there was a class of tenants holding on leases for lives, or for a term of years, and paying a rent in land produce, in services, or in money. Whether they gradually sprung up from the class of bondmen, according to Lord Kames,[2] or existed from the earliest period of the feudal constitution, according to other writers,[3] their number cannot be supposed to have been considerable during the middle ages. The stock which these tenants employed in cultivation commonly belonged to the proprietor, who received a proportion of the produce as rent; a system which still exists in France and in other parts of the Continent, where such tenants are called *metayers*, and some vestiges of which may yet be traced in the *steel-bow* of the law of Scotland. Leases of the thirteenth century still remain;[4] and both the laws and chartularies[5] clearly prove the existence in Scotland of a class of cultivators distinct from the *serfs* or bondmen. Yet the condition of these tenants seems to have been very different from that of the tenants of the present day; and the lease approached nearer in its form to a feu charter than to the mutual agreement now in use. It was of the nature of a beneficiary grant by the proprietor, under certain conditions, and for a limited period: the consent of the tenant seems never to have been doubted. In the common expression, "granting a lease," we have retained an idea of the original character of the deed, even to the present time.

Crops cultivated.

The corn crops cultivated during this period seem to have been of the same species, though all of them probably much inferior in quality to what they are in the present day. Wheat, the most valuable grain, must have borne a small proportion, at least in Britain, to that of other crops; the remarkable fluctuation of price, its extreme scarcity, indicated by the extravagant rate at which it was sometimes sold, as well as the preparatory cultivation required, may convince us that its consumption was confined to the higher orders, and that its growth was by no means extensive. Rye and oats furnished the bread and drink of the great body of the people of Europe. Cultivated herbage and roots were then unknown in the agriculture of Britain. It was not till the end of the reign of Henry VIII. that any sallads, carrots, or other edible roots were produced in England. The little of these vegetables that was used, was formerly imported from Holland and Flanders. Queen Catharine, when she wanted a sallad, was obliged to dispatch a messenger thither on purpose.[6]

The ignorance and insecurity of those ages, which necessarily confined the cultivation of corn to a comparatively small portion of country, left all the rest of it in a state of nature, to be depastured by the inferior animals, then only occasionally subjected to the care and control of man. Cultivators were crowded together in miserable hamlets; the ground contiguous was kept continually under tillage; and beyond this, wastes and woodlands of a much greater extent were appropriated to the maintenance of their flocks and herds, which pastured indiscriminately, with little attention from their owners.

The low price of butcher-meat, though it was then the food of the common people, when compared with the price of corn, has been justly noticed by several writers as a decisive proof of the small progress of civilisation and industry.

Agriculture of the Continent of Europe.

According to the reports of a writer who has had access to the best sources of information, in addition to his own observations, the present state of the agriculture of the greater part of the Continent of Europe is not very different from what it was in Britain during the prevalence of the feudal system. "The greater part of France," he says, "a still much greater portion of Germany, and nearly the whole of Prussia, Austria, Poland, and Russia, present a wretched uniformity of system. It is called the three-course husbandry, consisting of, 1*st*, one year's clean fallow; 2*d*, winter corn, chiefly rye, with a proportion of wheat commensurate to the manure that can be applied, 3*d*, summer corn, or barley and oats. There are occasional and small deviations from this system. In some few cases potatoes, in others peas, are grown, in the fallow year;

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[1] *History of England*, chap. xxiii.

[2] Bell's *Treatise on Leases*.

[3] Chalmers's *Caledonia*, book iv. c. 6.

[4] Kames's *Law Tracts*.

[5] Sir John Cullum's *History and Antiquities of Hawsted* (*Suffolk*.)

[6] Hume's *History of England*, chap. xxiii.

but they are only minute exceptions to the generally established system. It is not surprising that under such a system the produce should not be much more than four times the quantity of seed, at which rate it is calculated, as appears to be rightly, by Baron Alexander Humboldt."

"The fields are almost universally uninclosed, and exposed to the most injurious effects of a changeable and an intemperate climate. The ancient feudal system of tenure is still continued, modified indeed, and softened in some few parts, but not to a degree or an extent that deserves to be taken into account in the view now under consideration of the countries as a whole. The peasants, for the most part, are *adstricti glebæ;* and where, by recent laws, their condition has been changed, the practical effect has yet hardly had time to exhibit any observable improvement in their state. Labour, whether of men or of cattle, is usually exchanged for the occupancy of land; and hence the labour is performed in the most negligent and imperfect manner, that the vigilance of an overseer, who cannot be everywhere present, will allow.

"The lords of the soil, besides their demesnes, have the right of pasturage on the fields of their tenants from harvest to the next seed-time: hence none of those intervening crops which tend to enrich the soil can be cultivated without infringing on their rights.

"Among the cultivators of the land little or no accumulation of capital has been formed; from the lord to the lowest grade of the peasantry, all are alike destitute of disposable funds. The lords are only rich in land, and sufficiently at their ease, if that land be unencumbered with mortgages or annuities. The peasants, whether owners of the live stock and of the implements, or having the use of them with the land from its owners, are content to live on, from year to year, eating their own produce, growing their own wool and flax, and converting them into garments. They are quite satisfied if they can dispose of as much surplus produce as will pay the small share of money rent which becomes due to their lord." (*Tracts relating to the Corn Trade and Corn Laws*, by William Jacob, Esq. 1828.)

It is certain, however, that an improved system has been introduced, and is extending itself, though slowly, in many parts of the countries which this writer has mentioned. Public establishments have been formed, which afford examples of correct management; and by these means knowledge is diffused among the principal land-owners in the first instance, and must ere long descend to the cultivator. Since the peace, many of the former class have visited other countries, and particularly Great Britain, with a view to the improvement of their estates. Some of them have held out encouragement to settlers from this country; others carried back our best implements, with farm-bailiffs capable of instructing their people in the use of them, and of introducing our system of management generally; and not a few individuals of rank and influence in most parts of the Continent of Europe are now well acquainted with our agriculture, by their own personal observation. Prompted by interest, their active minds, no longer occupied in war, seem to enter eagerly upon this new field of employment. It is evident, indeed, from the great increase which has taken place of late in the population of these countries, as well as of our own, that a corresponding increase of produce must now be drawn from the soil. In all old peopled countries, the extension of tillage to fresh lands, without any improvement in the management, presents only a temporary and very limited resource.

At present, however, we have certainly little to learn from the agriculture of other countries; at least very little that can be beneficially introduced into our climate, which forbids any attempt at cultivating the fruits of the south of Europe. Even on a similar soil, and in the same latitude, the labours of the husbandman must be to a considerable extent directed and controlled by the local circumstances in which he is placed. This, perhaps, is the principal reason why the old system of successive crops of corn still prevails so generally throughout the Continent. The demand for butcher-meat, for instance, may not be such as to afford a suitable return for the extended culture of turnips and other ameliorating crops, which are found so beneficial in this country.

We should except from this remark much of the Netherlands, and probably a part of Italy. Flanders has long been celebrated for its agriculture; and the care and success with which its labours are conducted seem not unworthy the attention of our best cultivators. The culture of the Vale of Arno, in Italy, also presents an interesting object, and has been warmly eulogized by Chateauvieux and other travellers. But instead of going into details here, we shall notice, under the heads to which they belong, the practices that appear to us of most importance in the agriculture of other countries, when we come to describe our own.

Before entering upon this our main object, it may not be without its interest to present a concise view of the progress of our agriculture to its present state, from the rude condition in which, in common with that of the rest of Europe, it was found at the time when we first have authorities to refer to on the subject. Such a view must necessarily include notices of the principal laws affecting it, as well as of our early writers, whose works are very little known; and it may serve to convey some idea of the successive changes that have occurred in the condition of the great body of our people.

The subject of this article will thus be considered under two divisions. In the *first*, we shall treat of the history of British agriculture; and in the *second*, of its present state; describing under the latter the crops, culture, and general management adapted to different soils, agreeably to the practice of our best cultivators.

PART I.

History of British Agriculture.

Agriculture in England to the end of the 15th century.

Of the early agriculture of England, and of the condition of its cultivators, we may form some conception by adverting to a few of the enactments, from the Conquest down to the beginning of the reign of Henry VII. in 1485, when the feudal system, which had been gradually falling into decay, was almost dissolved in that country.

One of the earliest and greatest grievances was the levying of Purveyance. This originally comprehended the necessary provisions, carriages, &c. which the nearest farmers were obliged to furnish to the king's armies at the current prices, and to his houses and castles in time of war. It was called the *great purveyance*, and the officers who collected those necessaries were called purveyors. The smaller purveyance included the necessary provisions and carriages for the king's household, when living at home, or travelling through the kingdom, which the tenants on the king's demesne lands were obliged to furnish gratis; and the practice came to be adopted by the barons and great men, in every tour which they thought proper to make in the country. These exactions were so grievous, and levied in so licentious a manner, that the farmers, when they heard of the court's approach, often deserted their houses, as if the country had been invaded by an enemy. "Purveyance," says Dirom,[1] "was perhaps for many centuries the chief obstruction to the agriculture and improvement of Great Britain. Many laws were made for the reformation and regulation of purveyance, but without effect; and the practice continued down to so late a period as the reign of James the First."

The home trade in corn was restrained by acts against forestallers in 1360, and at several subsequent periods. For many years after the Conquest, the greater part of the trade of England was carried on in markets and fairs; and a very considerable part of the revenue of the crown arose from the duties payable to the king, upon the goods brought to them for sale. The barons had also tolls at the fairs within their respective jurisdictions. When farmers and merchants were bringing their corn and other necessaries to be sold there, they were sometimes met on the way by persons who purchased their commodities, in order to retail them at a higher price. Thus the king and the lords of the manor lost the several duties payable to them; and the price, it was thought, was at the same time raised to the inhabitants. Such were the original forestallers, who were subjected by several statutes to severe penalties. This crime of forestalling, and the kindred ones of regrating and engrossing, were carefully defined, and the different degrees of punishment specified, in a new statute in 1552, to be afterwards noticed. An early law of 1266, for regulating the assize of bread and ale, furnishes a clear proof of the little intercourse that must have subsisted at that time between town and country. "Brewers in cities," says the statute, "may well afford to sell two gallons of beer or ale for a penny, and out of cities three or four gallons for a penny."

Several laws were made in the fourteenth and fifteenth centuries, permitting the exportation of grain when the price of wheat did not exceed six shillings and eightpence a quarter; and in 1463 importation was prohibited when the price was lower. The last statute, however, was little attended to, and foreign grain was admitted as before; while the state of the country, and the restrictions on internal commerce, scarcely permitted any advantage to be derived from the acts allowing exportation.

Husbandry of Scotland.

In Mr Chalmers's *Caledonia*, a great many valuable notices are collected regarding the husbandry of Scotland during these ages. It is evident from his elaborate researches, that the progress of cultivation in the 13th century had been greater than we should have expected from the turbulence of the times, and the comparatively rude and uncivilized state of society. Purveyance, and other obstructions to improvement, were nearly the same in Scotland as in England; the laws regarding the corn trade appear, in some instances, to have been copied from those of England; and in the northern, as in the southern part of the island, the clergy were by far the most skilful and industrious husbandmen.

Yet it is difficult to reconcile the idea of any considerable improvement, particularly in so far as regards the extensive cultivation of wheat (which Mr Chalmers infers from the authorities he quotes), with an act passed in 1426, which ordained every husbandman tilling with a plough of eight oxen to sow at least a firlot (little more than a Winchester bushel) of wheat, and half a firlot of peas, with a proportion of beans; or with the state of the districts only a few years ago, where wheat is said to have been extensively grown at that early period.

By statute 1449, the tenant was for the first time secured in possession, during the term of his lease, against a purchaser of the land; and in 1469 he was protected from having his property carried off for the landlord's debts, beyond the amount of rent actually due; an enactment which proves his miserable condition before that time.

Writers on agriculture.

Soon after the beginning of the 16th century, agriculture partook of the general improvement which followed the invention of printing, the revival of learning, and the more settled authority of government; and instead of the occasional notices of historians, we can now refer to regular treatises, written by men who engaged eagerly in this neglected and hitherto degraded occupation. We shall therefore give a short account of the principal works, as well as of the laws and general policy of Britain, in regard to agriculture, from the early part of the sixteenth century to the Revolution in 1688, when a new era commenced in the legislation of corn, and soon after in the practice of the cultivator.

Fitzherbert.

The first and by far the best of our early works is the *Book of Husbandry*, printed in 1534, commonly ascribed to Fitzherbert, a judge of the common pleas in the reign of Henry VIII. This was followed, in 1539, by the *Book of Surveying and Improvements*, by the same author. In the former treatise we have a clear and minute description of the rural practices of that period, and from the latter may be learned a good deal of the economy of the feudal system in its decline. The *Book of Husbandry* has scarcely been excelled by any later production, in as far as concerns the subjects of which it treats; for at that time cultivated herbage and edible roots were still unknown in England. The author writes from his own experience of more than forty years; and, with the exception of passages denoting his belief in the superstition of the Roman writers, there is very little of this valuable work that should be omitted, and not a great deal that need be added, in so far as regards the culture of corn, in a manual of husbandry adapted even to the present time. Fitzherbert touches on almost every department of the art, and in about a hundred octavo pages has contrived to condense more practical information than will be found scattered through as many volumes of later times; and yet he is minute even to the extreme on points of real utility. There is no reason to say, with Mr Harte, that he had revived the husbandry of the Romans; he merely describes the practices of the age in which he lived; and from his commentary on the old statute *extenta manerii*, in his *Book of Surveying*, in which he does not allude to any recent improvements, it is probable that the management which he details had been long established. But it may surprise some of the agriculturists of the present day to be told, that, after the lapse of almost three centuries, Fitzherbert's practice, in some material branches, has not been improved upon; and that in several districts abuses still exist, which were as clearly pointed out by him at that early period as by any writer of the present age.

The *Book of Husbandry* begins with the plough and other instruments, which are concisely and yet minutely described; and then about a third part of it is occupied with the several operations as they succeed one another throughout the year. Among other things in this part of the work, the following deserve notice:—"Somme (ploughs) wyll tourn the sheld bredith at every landsende, and plowe all one way;" the same kind of plough that is now found so useful on hilly grounds. Of wheel-ploughs he observes, that "they be good on even grounde that lyeth lyghte;" and on such lands they are still most commonly employed. Cart-wheels were sometimes bound with iron, of which he greatly approves. On the much agitated question about the employment of horses or oxen in labour, the most important arguments are distinctly stated. "In somme places," he says, "a horse plough is better," and in others an oxen plough, to which, upon the whole, he gives the preference; and to this, considering the practices of that period, they were probably entitled. Beans and peas seem to have been common crops. He mentions the different kinds of wheat, barley, and oats; and after describing the method of harrowing "all maner of cornnes," we find the roller employed. "They use to role their barley grounde after a showr of rayne, to make the grounde even to mowe." Under the article "To falowe," he observes, "the greater clottes (clods) the better wheate, for the clottes kepe the wheat warme all wynter; and at March they will melte and breake and fal in manye small peces, the whiche is a newe dongynge and refreshynge of the corne." This is agreeable to the present practice, founded on the very same reasons. "In May, the shepe folde is to be set out;" but Fitzherbert does not much approve of folding, and points out its disadvantages in a very judicious manner. "In the later end of May and the begynnynge of June, is tyme to wede the corne;" and then we have an accurate description of the different weeds, and the instruments and mode of weeding. Next comes a second ploughing of the fallow; and afterwards, in the latter end of June, the mowing of the meadows begins. Of this operation, and of the forks and rakes, and the haymaking, there is a very good account. The corn harvest naturally follows: rye and wheat were usually *shorn*, and barley and oats cut with the scythe. This intelligent writer does not approve of the practice, which still prevails in some places, of cutting wheat high, and then mowing the stubbles. "In Somersetshire," he says, "they do shere theyr wheat very lowe; and the wheate strawe that they purpose to make *thacke* of, they do not threshe it, but cut off the ears, and bynd it in sheves, and call it *rede*, and therewith they thacke theyr houses." He recommends the practice of setting up corn in shocks, with two sheaves to cover eight, instead of ten sheaves, as at present; probably owing to the straw being then shorter. The corn was commonly housed; but if there be a want of room, he advises that the ricks be built on a scaffold, and not upon the ground. Corn-stacks are now beginning to be built on pillars and frames. The fallow received a third ploughing in September, and was sown about Michaelmas. "Wheat is moost commonlye sowne under the forowe, that is to say, cast it uppon the falowe, and then plowe it under;" and this branch of his subject is concluded with directions about threshing, winnowing, and other kinds of barn-work.

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[1] *Inquiry into the Corn Laws, &c. p. 9.*

Fitzherbert next proceeds to live stock. "An housbande," he says, "can not well thryue by his corne without he have other cattell, nor by his cattell without corne. And bycause that shepe, in myne opynyon, is the mooste profytablest cattell that any man can haue, therefore I pourpose to speake fyrst of shepe." His remarks on this subject are so accurate, that one might imagine they came from a storemaster of the present day; and the minutiæ which he details are exactly what the writer of this article has seen practised in the hilly parts of this country. In some places at present, "they neuer seuer their lambes from their dammes;" "and the poore of the peeke (high) countreye, and such other places, where, as they vse to milke theyr ewes, they vse to wayne theyr lambes at 12 weekes olde, and to mylke their ewes fiue or syxe weekes;" but that, he observes, "is greate hurte to the ewes, and wyll cause them that they wyll not take the ramme at the tyme of the yere for pouertye, but goo barreyne." "In June is tyme to shere shepe; and ere they be shorne, they must be verye well washen, the which shall be to the owner greate profyte in the sale of his wool, and also to the clothe-maker." It appears that *hand washing* was then a common practice; and yet in the west and north of Scotland, at this day, sheep are never washed at all. His remarks on horses, cattle, &c. are not less interesting; and there is a very good account of the diseases of each species, and some just observations on the advantage of mixing different kinds on the same pasture. Swine and bees conclude this branch of the work.

The author then points out the great advantages of inclosures; recommends "quycksettynge, dychynge, and hedgeyng;" and gives particular directions about the *settes*, and the method of training a hedge, as well as concerning the planting and management of trees. We have then a short information "for a yonge gentylman that intendeth to thryue," and "a prolouge for the wiues occupation," in some instances rather too homely for the present time. Among other things, she is to "make her husband and herself somme clothes;" and "she maye haue the lockes of the shepe eyther to make blankettes and courlettes, or bothe." This is not so much amiss; but what follows will bring our learned judge into disrepute even with our most industrious housewives. "It is a wyues occupation," he says, "to wynowe all maner of cornes, to make malte, to washe and wrynge, to make heye, shere corne, and, in time of nede, to helpe her husbande to fyll the mucke wayne or dounge carte, dryue the ploughe, to loode heye, corne, and suche other; and to go or ride to the market to sel butter, chese, mylke, egges, chekyns, capons, hennes, pygges, gese, and all maner of cornes." The rest of the book contains some useful advices about diligence and economy; and concludes, after the manner of the age, with many pious exhortations.

Such is Fitzherbert's *Book of Husbandry*, and such was the state of agriculture in England in the early part of the sixteenth century, and probably for a long time before; for he nowhere speaks of the practices which he describes or recommends as of recent introduction.

The *Book of Surveying* adds considerably to our knowledge of the rural economy of that age. "Four maner of commens" are described; several kinds of mills for corn and other purposes, and also "quernes that goo with hand;" different orders of tenants, down to the "boundmen," who "in some places contynue as yet;" "and many tymes, by colour thereof, there be many freemen taken as boundmen, and their lands and goods is taken from them." Lime and marl are mentioned as common manures; and the former was sometimes spread on the surface to destroy heath. Both draining and irrigation are noticed, though the latter but slightly. And the work concludes with an inquiry "how to make a township that is worth XX. marke a yere, worth XX. li. a year:" from which we shall give a specimen of the author's manner, as well as of the economy of the age.

"It is undoubted, that to every townshyppe that standeth in tyllage in the playne countrey, there be errable landes to plowe and sowe, and leyse to tye or tedder theyr horses and mares upon, and common pasture to kepe and pasture their catell, beestes, and shepe upon; and also they have medowe grounde to get theyr hey upon. Than to let it be known how many acres of errable lande euery man hath in tyllage, and of the same acres in euery felde to chaunge with his neyghbours, and to leye them toguyther, and to make hym one seuerall close in euery felde for his errable lands; and his leyse in euery felde to leye them togyther in one felde, and to make one seuerall close for them all. And also another seuerall close for his portion of his common pasture, and also his porcion of his medowe in a seuerall close by itselfe, and al kept in seueral both in wynter and somer; and euery cottage shall haue his portion assigned hym accordynge to his rent, and than shall nat the ryche man ouerpresse the poore man with his cattell; and euery man may eate his oun close at his pleasure. And vndoubted, that hay and strawe that will find one beest in the house wyll finde two beestes in the close, and better they shall lyke. For those beestis in the house have short heare and thynne, and towards March they will pylle and be bare; and therefore they may nat abyde in the fylde before the heerdmen in winter tyme for colde. And those that lye in a close under a hedge haue longe heare and thyck, and they will neuer pylle nor be bare; and by this reason the husbande maye kepe twyse so many catell as he did before.

"This is the cause of this approwment. Nowe euery husbande hath sixe seuerall closes, whereof iii. be for corne, the fourthe for his leyse, the fyfte for his commen pastures, and the sixte for his haye; and in wynter time there is but one occupied with corne, and than hath the husbande other fyue to occupy tyll lente come, and that he hath his falowe felde, his ley felde, and his pasture felde al sommer. And when he hath mowen his medowe, than he hath his medowe grounde, soo that if he hath any weyke catell that wold be amended, or dyvers maner of catell, he may put them in any close he wyll, the which is a great advantage; and if all shulde lye commen, than wolde the edyche of the corne feldes and the aftermath of all the medowes be eaten in X. or XII. dayes. And the rych men that hath moche catell wold have the advantage, and the poore man can have no helpe nor relefe in wynter when he hath moste nede; and if an acre of lande be worthe sixe pens, or it be enclosed, it will be worth VIII. pens whan it is enclosed, by reason of the compostying and dongyng of the catell that shall go and lye upon it both day and nighte; and if any of his thre closes that he hath for his corne be worne or ware bare, than he may breke and plowe up his close that he hadde for his layse, or the close that he hadde for his commen pasture, or bothe, and sowe them with corne, and let the other lye for a time, and so shall he have alway reist grounde, the which will bear moche corne with lytel donge; and also he shall have a great profyte of the wod in the hedges whan it is growen; and not only these profytes and advantages beforesaid, but he shall save moche more than al these, for by reason of these closes he shall save meate, drinke, and wages of a shepeherde, the wages of the heerdman, and the wages of the swine herde, the which may fortune to be as chargeable as all his holle rent; and also his corne shall be better saved from eatinge or destroyeng with catel. For dout ye nat but heerdemen with their catell, shepeherdes with their shepe, and tieng of horses and mares, destroyeth moch corne, the which the hedges wold save. Paraduenture some men would say, that this shuld be against the common weale, bicause the shepeherdes, heerdmen, and swyneherdes, shuld than be put out of wages. To that it may be answered, though these occupations be not used, there be as many newe occupations that were not used before; as getting of quickesettes, diching, hedging, and plashing, the which the same men may use and occupye."

Tusser.

The next author who writes professedly on agriculture is Tusser, whose *Five Hundred Points of Husbandry*, published in 1562, was formerly in such high repute as to be recommended by Lord Molesworth to be taught in schools.[1] The edition of 1604 is the one we make use of here, in which the book of husbandry consists of 118 pages; and then follows the *Points of Housewifrie*, occupying 42 pages more. It is written in verse. Amidst a vast heap of rubbish, there are some useful notices concerning the state of agriculture at the time in different parts of England. Hops, which had been introduced in the early part of the sixteenth century, and on the culture of which a treatise was published in 1574 by Reynolde Scott, are mentioned as a well-known crop. Buckwheat was sown after barley. It seems to have been the practice then, in some places, to "*geld fillies*" as well as colts. Hemp and flax are mentioned as common crops. Inclosures must have been numerous in several counties; and there is a very good comparison between "champion (open fields) country, and several," which Blythe afterwards transcribed into his *Improver Improved*. Carrots, cabbages, turnips, and rape, are mentioned among the herbs and roots for the kitchen. There is nothing to be found in Tusser about serfs or bondmen, as in Fitzherbert's works. This author's division of the crop is rather curious, though probably quite inaccurate, if he means that the whole rent might be paid by a tenth of the corn.

"One part cast forth for rent due out of hand.
"One other part for seed to sow thy land.
"Another part leave parson for his tith.
"Another part for harvest, sickle and sith.
"One part for ploughwrite, cartwrite, knacker, and smith.
"One part to uphold thy teemes that draw therewith.
"Another part for servant and workman's wages laie.
"One part likewise for filbellie daie by daie.
"One part thy wife for needful things doth crave.
"Thyself and thy child the last part would have."

Googe.

The next writer is *Barnaby Googe*, whose *Whole Art of Husbandry* was printed in 1578, and again by Markham in 1614. The first edition is merely a translation of a German work; and very little is said of English husbandry in the second, though Markham made some trifling interpolations, in order, as it is alleged, to adapt the German husbandry to the English climate. It is for the most part made up of gleanings from the ancient writers of Greece and Rome, whose errors are faithfully retained, with here and there some description of the practices of the age, in which there is little of novelty or importance. Googe mentions a number of English writers who lived about the time of Fitzherbert, whose works have not been preserved.

For more than fifty years after this, or till near the middle of the seventeenth century, there are no systematic works on husbandry, though several treatises on particular departments of it. From these it is evident, that all the different operations of the farmer were performed with more care and correctness than formerly; that the fallows were better worked, the fields kept freer of weeds, and much more attention paid to manures of every kind. A few of the writers of this period deserve to be shortly noticed.

Plat.

Sir Hugh Plat, in his *Jewel House of Art and Nature*, printed in 1594 (which Weston in his catalogue erroneously gives to Gabriel Plattes), makes some useful observations on manures, but chiefly collected from other writers. His censure of the practice of leaving farm dung lying scattered about is among the most valuable.

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[1] *Some Considerations for the promoting of Agriculture and employing the Poor.* Dublin, 1723.

Norden.

Sir John Norden's *Surveyor's Dialogue*, printed in 1607, and reprinted with additions in 1618, is a work of considerable merit. The first three books of it relate to the rights of the lord of the manor, and the various tenures by which landed property was then held, with the obligations which they imposed. Among others, we find the singular custom so humorously described in the Spectator, of the incontinent widow riding upon a ram. In the fifth book there are a good many judicious observations on the "different natures of grounds, how they may be employed, how they may be bettered, reformed, and amended." The famous meadows near Salisbury are mentioned; and when cattle have fed their fill, hogs, it is pretended, "are made fat with the remnant; namely, with the knots and sappe of the grasse." "Clouer grasse, or the grasse honey suckle" (white clover), is directed to be sown with other hay seeds. "Carrot rootes" were then raised in several parts of England, and sometimes by farmers. London street and stable dung was carried to a distance by water, though it appears from later writers to have been got for the trouble of removing. And leases of 21 years are recommended for persons of small capital, as better than employing it in purchasing land; an opinion that prevails very generally among our present farmers.

Bees seem to have been great favourites with these early writers; and among others, there is a treatise by Butler, a gentleman of Oxford, called the *Feminine Monarchie*, or the *History of Bees*, printed in 1609, full of all manner of quaintness and pedantry.

Weston.

We shall pass over Markham, Mascall, Gabriel Plattes, and several other authors of this period, the best part of their writings being preserved by Blythe and Hartlib, of whom we shall say a little immediately. In Sir Richard Weston's *Discourse on the Husbandry of Brabant and Flanders*, published by Hartlib in 1645, we may mark the dawn of the vast improvements which have since been effected in Britain. This gentleman was ambassador from England to the elector palatine and king of Bohemia in 1619, and had the merit of being the first who introduced the *great clover*, as it was then called, into English agriculture, about 1645, and probably turnips also. His directions for the cultivation of clover are better than was to be expected. It thrives best, he says, when you sow it on the worst and barrenest ground, such as our worst heath ground is in England. The ground is to be pared and burnt, and unslacked lime must be added to the ashes. It is next to be well ploughed and harrowed; and about ten pounds of clover seed must be sown on an acre in April or the end of March. If you intend to preserve seed, then the second crop must be let stand till it come to a full and dead ripeness; and you shall have at the least five bushels per acre. Being once sown, it will last five years; and then being ploughed, it will yield, three or four years together, rich crops of wheat, and after that a crop of oats, with which clover seed is to be sown again. It is in itself an excellent manure, Sir Richard adds; and so it should be, to enable land to bear this treatment. In less than ten years after its introduction, that is, before 1655, the culture of clover, exactly according to the present method, seems to have been well known in England, and it had also made its way to Ireland.

Blythe.

A great many works on agriculture appeared during the time of the commonwealth, of which Blythe's *Improver Improved*, and Hartlib's *Legacy*, are the most valuable. The first edition of the former was published in 1649, and of the latter in 1650; and both of them were enlarged in subsequent editions. In the first edition of the *Improver Improved*, no mention is made of clover, nor in the second of turnips; but in the third, published in 1662, clover is treated of at some length, and turnips are recommended as an excellent cattle crop, the culture of which should be extended from the kitchen garden to the field. Sir Richard Weston must have cultivated turnips before this; for Blythe says, that Sir Richard affirmed to himself he did feed his swine with them. They were first given boiled, but afterwards the swine came to eat them raw, and would run after the carts, and pull them forth as they gathered them; an expression which conveys an idea of their being cultivated in the fields.

Culture of turnips.

Blythe's book is the first systematic work in which there are some traces of the alternate husbandry so beneficially established since, by interposing clover and turnip between culmiferous crops. He is a great enemy to commons and common fields, and to retaining land in old pasture, unless it be of the best quality. His description of the different kinds of ploughs is interesting; and he justly recommends such as were drawn by two horses (some even by one horse), in preference to the weighty and clumsy machines which required four or more horses or oxen. Almost all the manures now used seem to have been then well known; and he brought lime himself from a distance of 20 miles. He speaks of an instrument which ploughed, sowed, and harrowed at the same time; and the *setting of corn* was then a subject of much discussion. "It was not many years," says Blythe, "since the famous city of London petitioned the parliament of England against two anusancies or offensive commodities, which were likely to come into great use and esteem; and that was Newcastle coal, in regard of their stench, &c., and hops, in regard they would spoyle the taste of drink, and endanger the people."

Hartlib.

Hartlib's *Legacy* is a very heterogeneous performance, containing, among some very judicious directions, a great deal of rash speculation. Several of the deficiencies which the writer complains of in English agriculture must be placed to the account of our climate, and never have been or can be supplied. Some of his recommendations are quite unsuitable to the state of the country, and display more of general knowledge and good intention, than of either the theory or practice of agriculture. Among the subjects deserving notice may be mentioned the practice of steeping and liming seed corn as a preventive of smut; changing every year the *species* of grain, and bringing seed corn from a distance; ploughing down green crops as manure; and feeding horses with broken oats and chaff. This writer seems to differ a good deal from Blythe about the advantage of interchanging tillage and pasture. "It were no losse to this island," he says, "if that we should not plough at all, if so be that we could certainly have corn at a reasonable rate, and likewise vent for all our manufactures of wool:" and one reason for this is, that pasture employeth more hands than tillage, instead of depopulating the country, as was commonly imagined. The *grout*, which he mentions "as coming over to us in Holland ships," about which he desires information, was probably the same with our present shelled barley; and mills for manufacturing it were introduced into Scotland from Holland towards the beginning of the last century.

To the third edition, published in 1655, are subjoined Dr Beatie's Annotations, with the writer of the Legacy's answers, both of them ingenious, and sometimes instructive. But this cannot be said of Gabriel Plattes's *Mercurius Lætificans*, also added to this edition, which is a most extravagant production. There are also several communications from Hartlib's different correspondents, of which the most interesting are those on the early cultivation and great value of clover. Hartlib himself does not appear much in this collection; but he seems to have been a very useful person in editing the works of others, and as a collector of miscellaneous information on rural subjects. It is strange that neither Blythe nor Hartlib, nor any of Hartlib's correspondents, seem ever to have heard of Fitzherbert's works.

Ray and Evelyn.

Among the other writers previous to the Revolution, we shall only mention Ray the botanist and Evelyn, both men of great talents and research, whose works are still in high estimation. A new edition of Evelyn's *Silva and Terra* was published in 1777 by Dr Hunter, with large notes and elegant engravings, and reprinted in 1812.

The preceding review commences with a period of feudal anarchy and despotism, and comes down to the time when the exertions of individual interest were protected and encouraged by the firm administration of equal laws; when the prosperity of Great Britain was no longer retarded by internal commotions, nor endangered by hostile invasion.

Laws

The laws of this period, in so far as they relate to agriculture and rural economy, display a similar progress in improvement.

against laying arable land to pasture,

From the beginning of the reign of Henry VII. to the end of Elizabeth's, a number of statutes were made for the encouragement of tillage, though probably to little purpose. The great grievance of those days was the practice of laying arable land to pasture, and suffering the farm-houses to fall to ruin. "Where in some towns," says the statute 4th Henry VII. (1488), "two hundred persons were occupied and lived of their lawful labours, now there are occupied two or three herdsmen, and the residue fall into idleness:" therefore it is ordained, that houses which within three years have been let for farms, with twenty acres of land lying in tillage or husbandry, shall be upheld, under the penalty of half the profits, to be forfeited to the king or the lord of the fee. Almost half a century afterwards, the practice had become still more alarming; and in 1534 a new act was tried, apparently with as little success. "Some have 24,000 sheep, some 20,000 sheep, some 10,000, some 6000, some 4000, and some more and some less;" and yet it is alleged the price of wool had nearly doubled, "sheep being come to a few persons' hands." A penalty was therefore imposed on all who kept above 2000 sheep; and no person was to take in farm more than two tenements of husbandry. By the 39th Elizabeth (1597), arable land made pasture since the 1st Elizabeth shall be again converted into tillage, and what is arable shall not be converted into pasture.

Many laws were enacted during this period against vagabonds, as they were called; and persons who could not find employment seem to have been sometimes confounded with those who really preferred idleness and plunder. The dissolution of the feudal system, and the suppression of the monasteries, deprived a great part of the rural population of the means of support. They could not be employed in cultivating the soil, for there was no middle class of farmers possessed of capital to be vested in improvements; and what little disposable capital was in the hands of great proprietors could not, in those rude times, be so advantageously embarked in the expensive and precarious labours of growing corn, as in pasturage, which required much less skill and superintendence. Besides, there was a constant demand for wool on the Continent; while the corn-market was not only confined by laws against exportation, but fettered by restrictions on the internal trade. The laws regarding the wages of labour and the price of provisions are a further proof of the ignorance of the age in regard to the proper subject of legislation.

against forestalling,

By the statute 1552 it is declared, that any person that shall buy merchandise, victual, &c. coming to market, or make any bargain for buying the same before they shall be in the market ready to be sold, or shall make any motion for enhancing the price, or dissuade any person from coming to market, or forbear to bring any of the things to market, &c. shall be deemed a *forestaller*. Any person who buys and sells again in the same market, or within four miles thereof, shall be reputed a *regrater*. Any person buying corn growing in the fields, or any other corn, with intent to sell again, shall be reputed an unlawful *ingrosser*. It was also declared, that no person shall sell cattle within five weeks after he had bought them. Licences, indeed, were to be granted in certain cases, and particularly when the price of wheat was at or under 6s. 8d. a quarter, and other kinds of grain in that proportion.

and for regulating the corn trade.

The laws regarding the exportation and importation of corn during this period could have had little effect in encouraging agriculture, though towards the latter part of it they gradually approached that system which was finally established at and soon after the Revolution. From the time of the above-mentioned statute against forestallers, which effectually prevented exportation, as well as the freedom of the home trade, when corn was above the price therein specified, down to 1688, there are at least twelve statutes on this subject; and some of them are so nearly the same, that it is probable they were not very carefully observed. The price at which wheat was allowed to be exported was raised from 6s. 8d. a quarter, the price fixed by the 1st and 2d of Philip and Mary (1553), to 10s. in 1562; to 20s. in 1593; to 26s. 8d. in 1604; to 32s. in 1623; to 40s. in 1660; to 48s. in 1663; and at last, in 1670, exportation was virtually permitted without limitation. Certain duties, however, were payable, which in some cases seem to have amounted to a prohibition; and until 1660 importation was not restrained even in years of plenty and cheapness. In permitting exportation, the object appears to have been revenue rather than the encouragement of production.

The first statute for levying tolls at turnpikes, to make or repair roads in England, passed in 1662.

Agriculture of Scotland in the 16th and 17th centuries.

Of the state of agriculture in Scotland in the 16th and the greater part of the 17th century, very little is known; no professed treatise on the subject appeared till after the Revolution. The south-eastern counties were the earliest improved, and yet in 1660 their condition seems to have been very wretched. Ray, who made a tour along the eastern coast in that year, says, "we observed little or no *fallow grounds* in Scotland; some ley ground we saw, which they manured with sea wreck. The men seemed to be very lazy, and may be frequently observed to plough in their cloaks. It is the fashion of them to wear cloaks when they go abroad, but especially on Sundays. They have neither good bread, cheese, nor drink. They cannot make them, nor will they learn. Their butter is very indifferent, and one would wonder how they could contrive to make it so bad. They use much pottage made of coalwort, which they call *kail*, sometimes broth of decorticated barley. The ordinary country-houses are pitiful cots, built of stone and covered with turfs, having in them but one room, many of them no chimneys, the windows very small holes, and not glazed. The ground in the valleys and plains bears very good corn, but especially bears barley or bigge, and oats, but rarely wheat and rye."[1]

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[1] *Select Remains of John Ray.* Lond. 1760.

It is probable that no great change had taken place in Scotland from the end of the 15th century, except that tenants gradually became possessed of a little stock of their own, instead of having their farm stocked by the landlord. "The minority of James V., the reign of Mary Stuart, the infancy of her son, and the civil wars of her grandson Charles I., were all periods of lasting waste. The very laws which were made during successive reigns, for protecting the tillers of the soil from spoil, are the best proofs of the deplorable state of the husbandman."[1]

Yet in the 17th century were those laws made which paved the way for the present improved system of agriculture in Scotland. By statute 1633, landholders were enabled to have their tithes valued, and to buy them either at nine or six years' purchase, according to the nature of the property. The statute 1685, conferring on landlords a power to entail their estates, was indeed of a very different tendency in regard to its effects on agriculture. But the two acts in 1695, for the division of commons, and separation of intermixed properties, have facilitated in an eminent degree the progress of improvement.

Progress of agriculture from 1688 to 1760.

From the Revolution to the accession of George III. the progress of agriculture was by no means so considerable as we should be led to imagine from the great exportation of corn. It is the opinion of well-informed writers,[2] that very little improvement had taken place, either in the cultivation of the soil or in the management of live stock, from the Restoration down to the middle of last century. Even clover and turnips, the great support of the present improved system of agriculture, were confined to a few districts, and at the latter period were scarcely cultivated at all by common farmers in the northern part of the island. Of the writers of this period, therefore, we shall notice only such as describe some improvement in the modes of culture, or some extension of the practices that were formerly little known.

In Houghton's *Collections on Husbandry and Trade*, a periodical work begun in 1681, we have the first notice of turnips being eaten by sheep. "Some in Essex have their fallow after turnips, which feed their sheep in winter, by which means the turnips are scooped, and so made capable to hold dews and rain water, which, by corrupting, imbibes the nitre of the air, and when the shell breaks it runs about and fertilizes. By feeding the sheep, the land is dunged as if it had been folded; and those turnips, though few or none be carried off for human use, are a very excellent improvement, nay, some reckon it so though they only plough the turnips in without feeding."[3] This was written in February 1694; but ten years before, Worlidge, one of his correspondents, observes, "sheep fatten very well on turnips, which prove an excellent nourishment for them in hard winters, when fodder is scarce; for they will not only eat the greens, but feed on the roots in the ground, and scoop them hollow even to the very skin. Ten acres (he adds) sown with clover, turnips, &c. will feed as many sheep as one hundred acres thereof would before have done."[4]

At this time potatoes were beginning to attract notice. "The potato," says Houghton, "is a *bacciferous* herb, with *esculent* roots, bearing winged leaves and a bell flower.

"This, I have been informed, was brought first out of Virginia by Sir Walter Raleigh; and he stopping at Ireland, some was planted there, where it thrived very well, and to good purpose; for in their succeeding wars, when all the corn above the ground was destroyed, this supported them; for the soldiers, unless they had dug up all the ground where they grew, and almost sifted it, could not extirpate them; from whence they were brought to Lancashire, where they are very numerous, and now they begin to spread all the kingdom over. They are a pleasant food boiled or roasted, and eaten with butter and sugar. There is a sort brought from Spain, that are of a longer form, and are more luscious than ours; they are much set by, and sold for sixpence or eightpence the pound."[5]

Mortimer

The next writer is Mortimer, whose *Whole Art of Husbandry* was published in 1706, and has since run through several editions. It is a regular, systematic work, of considerable merit; and it does not appear that much improvement has been made since in the practices he describes, in many parts of Britain. From the third edition of Hartlib's *Legacy*, we learn that clover was cut green, and given to cattle; and it appears that this practice of *soiling*, as it is now called, had become very common about the beginning of last century, wherever clover was cultivated. Ryegrass was now sown along with it. Turnips were hand-hoed, and extensively employed in feeding sheep and cattle, in the same manner as at present.

Tull.

The first considerable improvement in the practice of that period was introduced by Jethro Tull, a gentleman of Berkshire, who began to drill wheat and other crops about the year 1701, and whose *Horse-hoeing Husbandry* was published in 1731. In giving a short account of the innovations of this eccentric writer, it is not meant to enter into any discussion of their merits. It will not detract much from his reputation to admit that, like most other men who leave the beaten path, he was sometimes misled by inexperience, and sometimes deceived by a too sanguine imagination. Had Tull confined his recommendation of the drill husbandry to leguminous and bulbous-rooted plants generally, and to the *cereal gramina* only in particular circumstances; and had he, without puzzling himself about the food of plants, been contented with pointing out the great advantage of pulverizing the soil in most cases, and extirpating weeds in every case, he would certainly have deserved a high rank among the benefactors of his country. A knowledge of his doctrines and practice, however, will serve as a necessary introduction to the present approved modes of culture.

Tull's theory is promulgated with great confidence; and in the controversy which he thought proper to maintain in support of it, he scrupled not to employ ridicule as well as reasoning. Besides the Roman writers *De Re Rustica*, Virgil in particular, whom he treats with high disdain, he is almost equally severe on Woodward, Bradley, and other writers of his own time.

As the distance between his rows appeared much greater than was necessary for the range of the roots of the plants, Tull begins by showing that these roots extend much farther than is commonly believed, and then proceeds to inquire into the nature of their food. After examining several hypotheses, he decides this to be fine particles of earth. The chief, and almost the only use of dung, he thinks, is to divide the earth, to dissolve "this terrestrial matter, which affords nutriment to the mouths of vegetable roots;" and this can be done more completely by tillage. It is therefore necessary not only to pulverize the soil by repeated ploughings before it be seeded, but, as it becomes gradually more and more compressed afterwards, recourse must be had to tillage while the plants are growing, and this is *hoeing*, which also destroys the weeds that would deprive the plants of their nourishment.

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[1] Chalmers's *Caledonia*, vol. ii. p. 732.

[2] *Annals of Agriculture*, No. 270. Harte's *Essays*. Comber on *National Subsistence*, p. 161.

[3] Houghton's *Collections on Husbandry and Trade*, vol. i. p. 213. edit. 1728.

[4] *Ibid.* vol. iv. p. 142-144.

[5] *Ibid.* vol. ii. p. 468.

The leading features of Tull's husbandry are his practice of laying the land into narrow ridges of five or six feet, and upon the middle of these drilling one, two, or three rows, distant from one another about seven inches when there were three, and ten inches when only two. The distance of the plants on one ridge from those on the contiguous one he called an *interval;* the distance between the rows on the same ridge, a *space* or *partition:* the former was stirred repeatedly by the horse-hoe, the latter by the hand-hoe.

The extraordinary attention this ingenious person gave to his mode of culture is perhaps without a parallel:—"I formerly was at much pains," he says, "and at some charge in improving my drills for planting the rows at very near distances, and had brought them to such perfection, that one horse would draw a drill with eleven shares, making the rows at three inches and a half distance from one another; and at the same time sow in them three very different sorts of seeds, which did not mix; and these, too, at different depths. As the barley-rows were seven inches asunder, the barley lay four inches deep. A little more than three inches above that, in the same channels, was clover; betwixt every two of these rows was a row of St Foin, covered half an inch deep.

"I had a good crop of barley the first year; the next year two crops of broad clover, where that was sown; and where hop-clover was sown, a mixed crop of that and St Foin; but I am since, by experience, so fully convinced of the folly of these, or any other mixed crops, and more especially of narrow spaces, that I have demolished these instruments in their full perfection as a vain curiosity, the drift and use of them being contrary to the true principles and practice of horse-hoeing.[1]"

In the culture of wheat, he began with ridges six feet broad, or eleven on a breadth of 66 feet; but on this he afterwards had fourteen ridges. After trying different numbers of rows on a ridge, he at last preferred two, with an intervening space of about ten inches. He allowed only three pecks of seed for an acre. The first hoeing was performed by turning a furrow from the row, as soon as the plant had put forth four or five leaves; so that it was done before or at the beginning of winter. The next hoeing was in spring, by which the earth was returned to the plants. The subsequent operations depended upon the circumstances and condition of the land and the state of the weather. The next year's crop of wheat was sown upon the intervals which had been unoccupied the former year; but this he does not seem to think was a matter of much consequence. "My field," he observes, "whereon is now the thirteenth crop of wheat, has shown that the rows may successfully stand upon any part of the ground. The ridges of this field were, for the twelfth crop, changed from six feet to four feet six inches. In order for this alteration the ridges were ploughed down, and then the next ridges were laid out the same way as the former, but one foot six inches narrower, and the double rows drilled on their tops; whereby, of consequence, there must be some rows standing on every part of the ground, both on the former partitions, and on every part of the intervals. Notwithstanding this, there was no manner of difference in the goodness of the rows; and the whole field was in every part of it equal, and the best I believe that ever grew on it. It is now the thirteenth crop, likely to be good, though the land was not ploughed crossways."[2]

It follows from this singular management, that Tull thought a succession of crops of different species altogether unnecessary; and he labours hard to prove against Dr Woodward, that the advantages of such a change under his plan of tillage were quite chimerical; though he seems to admit the benefit of a change of the seed itself. But the best method of determining the question would have been to have stated the amount of his crops per acre, and the quality of the grain, instead of resting the superiority of his management on the alleged saving of expense, when compared with the common broad-cast husbandry.

On the culture of turnip, both his principles and his practice are much more correct. The ridges were of the same breadth as for wheat, but only one row was drilled on each. His management while the crop was growing differs very little from the present practice. When drilled on the level, it is impossible, he observes, to hoe-plough them so well as when they are planted upon ridges. But the seed was deposited at different depths, the half about four inches deep, and the other half exactly over that, at the depth of half an inch. "Thus planted, let the weather be never so dry, the deepest seed will come up; but if it raineth immediately after planting, the shallow will come up first. We also make it come up at four times, by mixing our seed half new and half old, the new coming up a day quicker than the old. These four comings up give it so many chances for escaping the fly; it being often seen that the seed sown over night will be destroyed by the fly, when that sown the next morning will escape, and *vice versa:* or you may hoe-plough them when the fly is like to devour them; this will bury the greatest part of these enemies: or else you may drill in another row without new-ploughing the land."

Drilling and horse and hand-hoeing seem to have been in use before the publication of Tull's book. "Hoeing," he says, "may be divided into deep, which is our horse-hoeing; and shallow, which is the English hand-hoeing; and also the shallow horse-hoeing used in some places betwixt rows, where the intervals are very narrow, as 16 or 18 inches. This is but an imitation of the hand-hoe, or a succedaneum to it, and can neither supply the use of dung nor fallow, and may be properly called scratch-hoeing." But in his mode of forming ridges his practice seems to have been original; his implements display much ingenuity; and his claim to the title of father of the present horse-hoeing husbandry of Great Britain seems indisputable. A translation of Tull's book was undertaken at one and the same time in France, by three different persons of consideration, without the privity of each other. Two of them afterwards put their papers into the hands of the third, M. Du Hamel du Monceau of the Royal Academy of Sciences at Paris, who published a treatise on husbandry, on the principles of Mr Tull, a few years after. But Tull seems to have had very few followers in England for more than 30 years. The present method of drilling and horse-hoeing turnips was not introduced into Northumberland till about the year 1780;[3] and it was then borrowed from Scotland, the farmers of which had the merit of first adopting Tull's management in the culture of this root about 1760, and from whom it has since made its way, but slowly, into the southern part of the island.

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[1] *Horse-hoeing Husbandry*, p. 62. Lond. 1762.

[2] *Ibid.* p. 424.

[3] *Northumberland Survey*, p. 100.

Among the English writers of this period may be mentioned Bradley, Lawrence, Hales, Miller, Ellis, Smith, Hill, Hitt, Lisle, and Home. Most of their works went through several editions in a few years; at once a proof of the estimation in which they were held, and of the direction of the public mind towards investigating the principles and practice of agriculture.

Writers on Scottish husbandry. Donaldson.

Of the progress of the art in Scotland, till towards the end of the 17th century, we are almost entirely ignorant. The first work, written by Donaldson, was printed in 1697, under the title of *Husbandry Anatomized; or, an Inquiry into the Present Manner of Teiling and Manuring the Ground in Scotland.* It appears from this treatise, that the state of the art was not more advanced at that time in North Britain than it had been in England in the time of Fitzherbert. Farms were divided into infield and outfield; corn crops followed one another without the intervention of fallow, cultivated herbage, or turnips, though something is said about fallowing the outfield; inclosures were very rare; the tenantry had not begun to emerge from a state of great poverty and depression; and the wages of labour, compared with the price of corn, were much lower than at present; though that price, at least in ordinary years, must appear extremely moderate in our times. Leases for a term of years, however, were not uncommon; but the want of capital rendered it impossible for the tenantry to attempt any spirited improvements.

Donaldson first points out the common management of that period, which he shows to have been very unproductive; and afterwards recommends what he thinks would be a more profitable course. "Of the dale ground," he says, "that is, such lands as are partly hills and partly valleys, of which sorts may be comprehended the greatest part of arable ground in this kingdom, I shall suppose a farmer to have a lease or tack of three score acres, at three hundred merks of rent per annum (L.16. 13s. 4d. sterling). Perhaps some who are not acquainted with rural affairs may think this cheap: but those who are the possessors thereof think otherwise, and find difficulty enough to get the same paid, according to their present way of manuring thereof. But that I may proceed to the comparison, I shall show how commonly this farm-room is managed. It is commonly divided into two parts, viz. one-third croft, and two-thirds outfield, as it is termed. The croft is usually divided into three parts; to wit, one-third barley, which is always dunged that year barley is sown thereon; another third oats; and the last third peas. The outside field is divided into two parts, to wit, the one half oats, and the other half grass, two years successively. The product which may be supposed to be on each acre of croft, four bolls (three Winchester quarters), and that of the outfield, three (2¼ quarters); the quota is seven score bolls, which we shall also reckon at five pounds (8s. 4d.) per boll, cheap year and dear year one with another. This, in all, is worth L.700 (L.58. 6s. 8d. sterling).

"Then let us see what profit he can make of his cattle. According to the division of his lands, there is 20 acres of grass, which cannot be expected to be very good, because it gets not leave to lie above two years, and therefore cannot be well swarded. However, usually, besides four horses, which are kept for ploughing the said land, ten or twelve nolt are also kept upon a farm-room of the above-mentioned bounds; but, in respect of the badness of the grass, as said is, little profit is had of them. Perhaps two or three stone of butter is the most that can be made of the milk of his kine the whole summer, and not above two heffers brought up each year. As to what profit may be made by bringing up young horses, I shall say nothing, supposing he keeps his stock good by those of his own upbringing. The whole product, then, of his cattle cannot be reckoned above fifty merks (L.2. 15s. 6d.). For, in respect his beasts are in a manner half-starved, they are generally small; so that scarce may a heffer be sold at above twelve pounds (L.1 sterling). The whole product of this farm-room, therefore, exceeds not the value of L.733 (L.61. 1s. 8d. sterling), or thereabout." The labourers employed on this farm were two men and one woman, besides a herd in summer, and other servants in harvest.

Donaldson then proceeds to point out a different mode of management, which he calculates to be more profitable; but no notice is taken of either clover or turnips as crops to be raised in his new course, though they are incidentally noticed in other parts of the work.

"I also recommend potatoes as a very profitable root for husbandmen and others that have numerous families. And because there is a peculiar way of planting this root, not commonly known in this country, I shall here show what way it is ordinarily planted or set. The ground must be dry; and so much the better it is if it have a good soard of grass. The beds or riggs are made about eight foot broad, good store of dung being laid upon your ground; horse or sheep dung is the proper manure for them. Throw each potatoe or sett (for they were sometimes cut into setts) into a knot of dung, and afterwards dig earth out of the furrows, and cover them all over, about some three or four inches deep; the furrows left between your riggs must be about two foot broad, and little less will they be in depth before your potatoes be covered. You need not plant this root in your garden; they are commonly set in the fields, and wildest of ground, for enriching of it." As to their consumption, they were sometimes "boiled and broken, and stirred with butter and new milk; also roasted, and eaten with butter; yea, some make bread of them, by mixing them with oat or barley meal; others parboil them, and bake them with apples, after the manner of tarts."

There is a good deal in this little treatise about sheep, and other branches of husbandry; and, if the writer was well informed, as in most instances he appears to have been, his account of prices, of wages, and generally of the practices of that period, is very interesting.

Lord Belhaven.

The next work on the husbandry of Scotland is, *The Countryman's Rudiments, or an advice to the Farmers in East Lothian, how to labour and improve their grounds;* said to have been written by Lord Belhaven about the time of the Union, and reprinted in 1723. In this we have a deplorable picture of the state of agriculture in what is now the most highly improved county in Scotland. His lordship begins with a very high encomium on his own performance. "I dare be bold to say, there was never such a good easy method of husbandry as this, so succinct, extensive, and methodical in all its parts, published before." And he bespeaks the favour of those to whom he addresses himself, by adding, "neither shall I affright you with hedging, ditching, marling, chalking, paring and burning, draining, watering, and such like, which are all very good improvements indeed, and very agreeable with the soil and situation of East Lothian; but I know ye cannot bear as yet a crowd of improvements, this being only intended to initiate you in the true method and principles of husbandry." The farm-rooms in East Lothian, as in other districts, were divided into infield and outfield. "The infield (where wheat is sown) is generally divided by the tenant into four divisions, or breaks, as they call them, viz. one of wheat, one of barley, one of pease, and one of oats; so that the wheat is sowed after the pease, the barley after the wheat, and the oats after the barley. The outfield land is ordinarily made use of promiscuously for feeding of their cows, horse, sheep, and oxen; 'tis also dunged by their sheep, who lay in earthen folds; and sometimes, when they have much of it, they fauch or fallow a part of it yearly." Under this management the produce seems to have been three times the seed; and yet, says his lordship, "if in East Lothian they did not leave a higher stubble than in other places of the kingdom, their grounds would be in a much worse condition than at present they are, though bad enough."—"A good crop of corn makes a good stubble, and a good stubble is the equalest mucking that is." Among the advantages of inclosures, he observes, "you will gain much more labour from your servants, a great part of whose time was taken up in gathering thistles and other garbage for their horses to feed upon in their stables; and thereby the great trampling and pulling up, and other destruction of the corns, while they are yet tender, will be prevented." Potatoes and turnips are recommended to be sown in the yard (kitchen-garden). Clover does not seem to have been in use. Rents were paid in corn; and, for the largest farm, which he thinks should employ no more than two ploughs, the rent was about six chalders of victual "when the ground is very good, and four in that which is not so good. But I am most fully convinced they should take long leases or tacks, that they may not be straitened with time in the improvement of their rooms; and this is profitable both for master and tenant."

Society of Improvers.

Such was the state of the husbandry of Scotland in the early part of last century. The first attempts at improvement cannot be traced farther back than 1723, when a number of landholders formed themselves into a society, under the title of the *Society of Improvers in the Knowledge of Agriculture in Scotland*. The earl of Stair, one of their most active members, is said to have been the first who cultivated turnips in that country. The *Select Transactions* of this society were collected and published in 1743 by Mr Maxwell, who took a large part in its proceedings. It is evident from this book that the society had exerted itself in a very laudable manner, and apparently with considerable success, in introducing cultivated herbage and turnips, as well as in improving the former methods of culture. But there is reason to believe that the influence of the example of its numerous members did not extend to the common tenantry, who are always unwilling to adopt the practices of those who are placed in a higher rank, and supposed to cultivate land for pleasure rather than profit. Though this society, the earliest probably in the United Kingdom, soon counted upwards of 300 members, it existed little more than 20 years. Maxwell delivered lectures on agriculture for one or two sessions at Edinburgh, which, from the specimen he has left, ought to have been encouraged.

Maxwell.

In the introductory paper in Maxwell's collection, we are told, that "the practice of draining, inclosing, summer fallowing, sowing flax, hemp, rape, turnip and grass seeds, planting cabbages after, and potatoes with, the plough, in fields of great extent, is introduced; and that, according to the general opinion, more corn grows now yearly where it was never known to grow before, these twenty years last past, than perhaps a sixth of all that the kingdom was in use to produce at any time before."

Invention of a threshing-machine.

In this work we find the first notice of a threshing-machine; it was invented by Mr Michael Menzies, advocate, who obtained a patent for it. Upon a representation made to the society that it was to be seen working in several places, they appointed two of their number to inspect it; and in their report they say, that one man would be sufficient to manage a machine which would do the work of six. One of the machines was "moved by a great water-wheel and triddles," and another "by a little wheel of three feet diameter, moved by a small quantity of water." This machine the society recommended to all gentlemen and farmers.

The next work is by the same Mr Maxwell, printed in 1757, and entitled the *Practical Husbandman; being a collection of miscellaneous papers on Husbandry*, &c. In this book the greater part of the *Select Transactions* is republished, with a number of new papers, among which, an *Essay on the Husbandry of Scotland*, with a proposal for the improvement of it, is the most valuable. In this he lays it down as a rule, that it is bad husbandry to take two crops of grain successively, which marks a considerable progress in the knowledge of modern husbandry; though he adds, that in Scotland the best husbandmen after a fallow take a crop of wheat; after the wheat, peas; then barley, and then oats; and after that they fallow again. The want of inclosures was still a matter of complaint. The ground continued to be cropped so long as it produced two seeds; the best farmers were contented with four seeds, which was more than the general produce.

The first act of parliament for collecting tolls on the highway in Scotland was passed in 1750, for repairing the road from Dunglass bridge to Haddington. In ten years after, several acts followed for the counties of Edinburgh and Lanark, and for making the roads between Edinburgh and Glasgow. The benefit which agriculture has derived from good roads, it would not be easy to estimate. The want of them was one great cause of the slow progress of the art in former times.

The Revolution in 1688 was the epoch of that system of corn laws to which very great influence has been ascribed, both on the practice of agriculture and the general prosperity of the country. But for an account of these and later statutes on the subject, we must refer to the article CORN LAWS.

The exportation of wool was prohibited in 1647, in 1660, and in 1688; and the prohibition strictly enforced by subsequent statutes. The effect of this on its price, and the state of the wool trade, from the earliest period to the middle of last century, are distinctly exhibited by the learned and laborious author of *Memoirs on Wool*, printed in 1747.

Progress since 1760.

The gradual advance in the price of land produce soon after the year 1760, occasioned by the increase of population, and of wealth derived from manufactures and commerce, has given a more powerful stimulus to rural industry, augmented agricultural capital in a greater degree, and called forth a more skilful and enterprising race of cultivators, than all the laws for regulating the corn trade could ever have effected. Most of the inventions for increasing produce and economizing labour have either been introduced, or improved and greatly extended, since that time; and by means of both, the free surplus has been vastly increased for the supply of the general consumption. The passing of more than 3000 bills of inclosure, in the late reign, before which the whole number was only 244, is a proof how much more rapidly the cultivation of new land has proceeded than formerly; and the garden-like appearance of the country, as well as the striking improvement in the condition of all classes of the rural population, display, in the most decided manner, the skill and the success with which this great branch of national industry is now followed throughout the greater part of Britain.

In a view of the progress of husbandry, any considerable improvements in the species of crops cultivated, and the order in which they succeed one another, in agricultural machinery, and in the kinds and varieties of live stock, are entitled to hold a very prominent place. Our limits do not permit us to do more than just to notice a few of the most important here; but we shall have occasion to describe them more fully in the second part of this article, when treating on the practice and present state of our agriculture.

Alternate husbandry.

The great line of distinction between the present and the former courses of cropping, consists in the alternation of what are called exhausting and ameliorating crops. The best cultivators rarely take two corn crops in succession; but corn is almost universally succeeded by a leguminous crop, or one of herbage, cut or pastured, or turnips, cabbages, rape, &c.; or, when the soil is not suited to turnips, by a summer fallow, recurring at as distant an interval as its condition will permit. In common language, a green or a pulse crop, or a plain fallow, is interposed between every two white corn crops. These green crops not only preserve the fertility of the soil, but when sown in rows, as most of them usually are, they afford an opportunity of extirpating weeds, by the use of the horse and hand hoe; and even when sown broad-cast, by their taking complete possession of the ground, if it is properly prepared, the growth of weeds is effectually checked. In other respects, these intermediate crops are of the utmost importance in every good course of management. Whether they be eaten on the ground or carried to the farm houses and straw yards, much valuable manure is obtained from their consumption; and on sandy or gravelly soils, when only a part of a turnip crop is eaten by sheep on the ground, the greatest defect of such land is removed by their treading, and in many cases it is rendered capable of producing as valuable a crop of wheat as soils of a closer texture. It is for these reasons that, by the cultivation of clover, and turnips in particular, in regular alternation with corn, the soil is so much enriched as to yield as much corn on the half of any given extent of land as the whole did under the old course of successive crops of corn; and, unless upon strong clays, an unproductive fallow is wholly dispensed with.

But these crops are not less valuable in another point of view. Before the introduction of clover and turnips, there was nothing for the maintenance of live stock but natural herbage in summer, with the addition of hay and straw in winter; and in the northern parts of the island in particular, where the winters are long and severe, it was seldom possible to do more, for about half the year, than preserve cattle and sheep from starving. Even in the most favourable situations, very little butcher-meat could be brought to market from December to June, unless at an expense which the great body of consumers were quite unable to reimburse. The more early maturity of cattle and sheep, and the regular supply of the market throughout the year, are therefore chiefly owing to turnips and clover, as well as the vast increase in the number of the live stock kept on arable land, and the great degree of perfection to which some breeds have been brought by the skilful experiments of several eminent agriculturists.

Live stock. Bakewell.

Among these, the first place is unquestionably due to Mr Robert Bakewell of Dishley, in Leicestershire. By his skilful selection at first, and constant care afterwards, to breed from the best animals, he at last obtained a variety of sheep, which, for early maturity, and the property of returning a great produce of mutton for the food they consume, as well as for the small proportion which the weight of the offal bears to that of the four quarters, are altogether unequalled either in this or any other country. The Dishley or new Leicester sheep, and their crosses, are now spread over the principal corn districts of Britain; and, from their quiet domesticated habits, are probably still the most profitable of all the varieties of sheep, on farms where the rearing and fattening of live stock are combined with the best courses of tillage crops.

The practice of Mr Bakewell and his followers furnishes an instance of the benefits of the division of labour, in a department of business where it was little to be expected. Their males were let out every year to breeders from all parts of England; and thus, by judiciously crossing the old races, all the valuable properties of the Dishley variety descended, after three or four generations, to their posterity. By no other means could this new breed have spread so rapidly, or been made to accommodate itself so easily to a change of climate and pasture. Another recommendation of this plan was, that the ram-hirer had a choice among a number of males of somewhat different properties, and in a more or less advanced stage of improvement, from which it was his business to select such as suited his particular object. These were reared by experienced men, who gave their principal attention to this branch alone; and having the best females as well as males, they were able to furnish the necessary supply of young males in the greatest variety, to those farmers whose time was occupied with other pursuits. The prices at which Mr Bakewell's rams were hired appear enormous. In 1789 he received twelve hundred guineas for the hire of three brought at one birth; two thousand for seven; and for his whole letting, at least three thousand guineas.

Merinos.

Merino sheep were first brought into England in 1788, when his late Majesty procured a small flock by way of Portugal. In 1791 another flock was imported from Spain. In 1804, when the annual sales commenced, this race began to attract much notice. Dr Parry of Bath crossed the Ryeland or Herefordshire sheep with the Merinos, and brought the wool of the fourth generation to a degree of fineness not excelled, it is said, by that of the pure Merino itself; while the carcass, in which the great defect of the Merinos consists, has been much improved. Lord Somerville and many other gentlemen have bestowed much attention on this valuable race, which, however, has not spread itself over the country; and the wool is understood to have deteriorated.

Swedish turnip.

One of the most valuable plants introduced into cultivation since 1760 is the ruta baga or Swedish turnip, which in a great degree supplies the great desideratum of late spring food for live stock, after the common turnip is generally much damaged, and sometimes almost wholly destroyed, by the severity and changes of the weather. The Scotish yellow turnip is for the same reason a most useful variety, coming in between the white turnips and the Swedish, in some situations supplying the place of the latter, and yielding generally a larger produce. A new variety of oats, called the potato oat, was accidentally discovered in 1788. It comes early, and gives a large produce both in grain and in meal, on good soils; and was soon cultivated over all the north of England and south of Scotland. But it has already begun to degenerate. A good many varieties of summer wheat have been introduced of late, but they are only partially cultivated.

Threshing-machine.

Under the head of agricultural machinery, we need only notice the improvement of the swing-plough by Small, and of the threshing-machine by Meikle; though the latter may rather claim the entire merit of the invention.

We shall have occasion to notice in its proper place the progress that has been made towards perfecting a machine for reaping corn, still an important desideratum.

The agriculture of Scotland has been benefited by an act in 1770, which relaxed the rigour of strict entails, and extended the powers of proprietors, in so far as regards the improvement of their estates and the granting of leases; but there is still much room for improvement in this branch of our legal polity.

Agricultural Societies.

There is nothing that shows more clearly the rapid progress of agriculture in Britain, than the great number of societies that have been lately formed, one or more in almost every county, for the diffusion of knowledge, and the encouragement of correct operations and beneficial discoveries. We have already noticed the Society of Improvers established in Scotland in 1723. Besides those respectable associations which have for their object the encouragement of arts, manufactures, and commerce generally, several large institutions have been formed, whose chief purpose is the improvement of agriculture. Among these the Bath and West of England Society, established in 1777, and the Highland Society of Scotland, in 1784, hold a conspicuous rank; nor ought we to pass over in silence the labours of the National Board of Agriculture, formed in 1793, but since abolished, which by means of the county-surveys has made us acquainted with the rural affairs of every part of the kingdom.

A great many excellent works on agriculture, and relative subjects, have been published since 1760; and among these several periodical miscellanies have been favourably received and widely circulated. But as they are comparatively recent, and the best of them well known, it is unnecessary to give any particular account either of their merits or defects.

PART II.

The Practice of British Agriculture.

We come now to our leading object, the present state of British agriculture, especially as it is found in our best cultivated counties. It is not our purpose to exhibit general views of a statistical nature,—such as the extent and produce of our territory, considered under the several divisions of corn-land, pastures, and wastes or tracts still in a state of nature. The proportion which each of these bears to the whole cannot perhaps be fixed with tolerable accuracy at any time, and is continually varying; and with regard to the aggregate produce, we have seen nothing but conjectural estimates, which, as might be expected, differ greatly from one another.

Soils.

The first thing which naturally calls for our attention in a treatise on the practice of agriculture is the SOIL, which may be termed the raw material on which the cultivator has to operate, and according to the nature of which his general management as well as his labour in detail must in a great measure be regulated.

In penetrating the superficial stratum, the first circumstance which presents itself is the different degree of resistance required to be overcome in different situations. Its component parts are found to be more or less cohesive; in some places nearly all of the same consistency, and in others mixed with decayed roots and small stones. The colour is also different, without any perceptible difference in other respects. These are the obvious varieties which occur immediately beneath the surface, or in what is properly called the *soil;* but upon going a little deeper, the texture and colour undergo further changes, even in the same situation. A compact, impervious mass, often imbedded with stones, sometimes succeeds to a superficial stratum of the most incohesive materials: elsewhere, the solid and dense surface soil passes, though commonly by slower gradations, into a substratum of an opposite description; and in many parts the rock itself, from which the soil is supposed to have been formed, rises so near the surface as to stop all further progress.

In addition to these obvious distinctions, it is soon observed that some soils are slow to admit moisture, and do not speedily part with it, but when dried become so indurated as to be reduced to a pulverulent state with great difficulty; while others are so porous as to allow water to pass through them freely, and so open to the influence of the atmosphere, that if it meets with any obstruction from the subsoil, it is very soon carried off by evaporation.

In the classification of soils with a view to practical utility, therefore, they may be all reduced under two general divisions, according to their texture. The terms stiff, heavy, strong, cohesive, and others of the same import, all denote soils of which the basis or principal ingredient is *clay;* as, on the other hand, those in which sand predominates are called loose, light, porous, friable. Under each of these divisions, however, there are several varieties, such as gravel, loam, chalk, calcareous, alluvial, peaty, &c.; to which are added the common epithets of rich and poor, cold and hot, thin or shallow, and deep, and various others.

Crops for different soils.

Of the crops best suited to these several kinds of soil, it is only necessary to observe here, that wheat, beans, clovers, and fibrous-rooted plants generally, are most productive on *clays;* while barley, turnips, and all bulbous and deep-rooted plants, thrive best in sandy soils. *Loam,* which may partake of either character, is an artificial soil, produced by cultivation and manure, and, when sufficiently deep, adapted to crops of every kind. *Gravelly soils,* which are usually considered as forming a distinct class, take their character from that of the rocky materials in which they abound. When very loose and porous, they are sometimes called *hungry,* the manure applied to them being as it were devoured and lost, from the want of materials in a state to be acted upon; but those of a better quality are not only productive both in corn and pasture, but their crops ripen very early. Calcareous matter, such as lime, chalk, and marl, is a necessary ingredient in all fertile soils, without which, indeed, it has been found impracticable to bring most crops to perfection. The soils formed by matters deposited by the tides and by rivers, called *alluvial,* usually consist of a variety of ingredients, and are for the most part very fertile. What is called a *mossy* or *peaty soil* is distinguished by its dark colour and spongy texture, and abounds in the roots of plants in a state of decay, from which, indeed, it seems to have been wholly formed. It is found in a great variety of situations, on the summits of mountains as well as in plains and hollows; in some cases so saturated with water as not to bear the weight of cattle, in others in so solid a form as to be cut for fuel; sometimes of the depth of many feet, and elsewhere of only a few inches; but in all situations its produce of stunted heath, occasionally intermixed with coarse herbage, is of little or no value. This description of soil, if it deserves the name, is of comparatively recent formation, having been found in several instances superincumbent upon cultivated soils which themselves appear to be alluvial, and consequently not of the earliest class. The terms *moor* and *moorish* are applied generally to inferior soils in a state of nature, whatever may be their distinctive character in other respects.

The quality of soils may sometimes be judged of with tolerable accuracy, by attending to the species of plants which they naturally produce, and observing whether they grow close and vigorous, so as to cover the soil completely, or rise feeble and scattered, with unoccupied spaces between. The clovers, for instance, grow freely on calcareous soils, and the common ragwort (*senecio Jacobæa*) and the corn-thistle (*serratula Arvensis*) usually indicate a fertile soil, whatever be its texture. Science has supplied other tests, for which we may refer to Sir Humphry Davy's *Agricultural Chemistry*. One of the simplest methods of ascertaining the presence of calcareous matter in the soil, is to pour upon it any strong acid, with which, if this ingredient abounds, it will effervesce freely. The power of retaining moisture, and, when dry, of absorbing it from the atmosphere, as well as the greater increase of temperature, which under the same circumstances takes place in some soils,—these and various other criteria may be employed to determine their comparative fertility. And, what is not unworthy of remark, it is known from experience that the productiveness of the soil, under similar circumstances in other respects, depends in some measure on the dryness or humidity of the climate. In the west of Scotland, for instance, where much more rain falls than in the east, light sandy soils do not suffer so much under a severe course of cropping as they are found to do in the latter situation.

Arrangement.

In describing the practice of agriculture, it may be thought that the process by which lands in a state of nature are first brought into cultivation would be entitled to our earliest consideration, and that we should then proceed to describe the successive operations by which our fields have arrived at their present condition. But a moment's reflection may convince us that such an arrangement would be inexpedient, if not impracticable, on the present occasion. The original state of much of our cultivated land, which has long since passed away, must have been very different in different situations, and would require a corresponding variety of operations to prepare it for growing corn; and a number of implements, however rude, must have been constructed, even before these operations could be commenced. It is only in an advanced stage of the art, and as a branch of general management, that the culture of wastes can demand our attention; for it is then only that capital and science may enable us to cultivate them with advantage.

But without pretending to scientific arrangement, we shall content ourselves with bringing together those parts of our subject that have a mutual relation and dependence on one another in practice, and endeavour to present its more important details under the four following chapters.

In the *first*, we shall treat of what regards the cultivation and products of ARABLE LAND; in the *second*, of the management of GRASS LANDS, and the improvement of WASTES; in the *third*, of agricultural LIVE STOCK; and in the *fourth*, which will be of a more general kind, we shall endeavour to point out those circumstances which have more particularly contributed to the improvement of agriculture in this country, and those also which seem still to obstruct its further advancement.

There are, besides the subjects which fall to be treated under these divisions, some others, which certainly form component parts of agricultural science, and to which it will be necessary to advert in this work; but as these subjects are not of equal interest to husbandmen generally, and as they are capable of being treated with advantage in a separate form, we shall reserve them for distinct articles, to be afterwards introduced under their respective heads. Such are the subjects of the DAIRY, of DRAINAGE, of EMBANKMENT, of IRRIGATION, and of WOODS and PLANTATIONS.

CHAP. I.

ARABLE LAND.

We shall endeavour to arrange all the most important details connected with this division of our subject under the following sections:—1. Of implements and machinery: 2. Of farm-buildings: 3. Of fences: 4. Of tillage: 5. Of fallowing: 6. Of the cultivation of the different crops: 7. Of the order of their succession: 8. Of the various substances used as manure, and the modes of applying them.

SECT. I. IMPLEMENTS AND MACHINERY.

The numerous implements of tillage husbandry may be arranged under these six heads;—such as are employed, 1. in preparing land for semination; 2. in depositing the seed; 3. during the growth of the plants; 4. in reaping and securing the crop; 5. in preparing it for market; and, 6. in the general purposes of a farm. But as the same implement is sometimes used for more than one purpose, it would be of little consequence to adhere strictly to this or any other arrangement. The implements required for rendering land fit for tillage do not belong to this part of the article, and several others that have not yet been brought into general use, or are employed only for particular purposes, shall be noticed under the sections to which they respectively belong.

1. *Ploughs.*

Ploughs.

Of ploughs there are a great many different sorts; and, besides the variety of construction occasioned by the difference of soils, and the different purposes for which they are employed even on the same soil, there is a considerable diversity in the form, in districts where both the soil and the mode of culture are nearly alike. The most obvious general distinction among ploughs is, their being constructed with or without wheels: and each of these kinds may be again distinguished by other circumstances;—such as the form of the mould-board and share; their operation in making one or more furrows at a time; their size; and the depth at which they are calculated to work, as in trench-ploughing. It would neither be of much utility, nor at all consistent with our limits, to describe all the numerous varieties of form. The nature of the operation to be performed, and the rules for constructing ploughs that shall be adapted to the different purposes of the cultivator, have been fully described in a variety of works, particularly in those noted below;[1] and all that is necessary here is to mention those ploughs that are in most general use in the best cultivated districts.

Swing-plough.

The *Swing-plough*, with a feathered sock or share, and a curved mould-board, is almost the only one used in Scotland, and throughout a considerable part of England. The old Scottish plough with a spear sock has been laid aside, except in a few of the least improved counties, where it is still found useful when the soil is encumbered by roots or stones. The swing-plough is drawn with less power than wheel-ploughs, the friction not being so great; and it probably admits of greater variations in regard to the breadth and depth of the furrow slice. It is usually drawn by two horses abreast in common tillage; but for ploughing between the rows of the drill culture, a smaller one, drawn by one horse, is commonly employed. A plough of this kind, having a mould-board on each side, is also used, both in forming narrow ridges for turnips and potatoes, and in laying up the earth to the roots of the plants, after the intervals have been cleaned and pulverized by the horse and hand hoe. This plough is sometimes made in such a manner that the mould-board may be shifted from one side to the other when working on hilly grounds; by which means the furrows are all laid in the same direction;—a mode of construction as old as the days of Fitzherbert, who wrote before the middle of the sixteenth century. This is called a *turn-wrest* plough.

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[1] Small's *Treatise on Ploughs and Wheel-Carriages*, 1784; Lord Kames's *Gentleman Farmer*; and Bailey on the *Construction of the Plough on Mathematical Principles*.

Rotherham plough.

Swing-ploughs, similar to the present, have been long known in England. In Blythe's *Improver Improved* (edit. 1652), we have engravings of several ploughs; and what he calls the "plain plough" does not seem to differ much in its principal parts from the one now in use. Amos, in an Essay on *Agricultural Machines*, says that a person named Lummis (whom he is mistaken in calling a Scotchman, see Maxwell's *Practical Husbandman*, p. 191.) "first attempted its construction upon mathematical principles, which he learned in Holland; but having obtained a patent for the making and vending of this plough, he withheld the knowledge of these principles from the public. However, one Pashley, plough-wright to Sir Charles Turner of Kirkleatham, having a knowledge of those principles, constructed upon them a vast number of ploughs. Afterwards his son established a manufactory for the making of them at Rotherham. Hence they obtained the name of the Rotherham plough; but in Scotland they were called the Dutch or patent plough."—"At length the Americans, having obtained a knowledge of those principles, either from Britain or Holland, claimed the priority of the invention; in consequence of which, Mr Jefferson, president of the United States, presented the principles for the construction of a mould-board, first to the Institute of France, and next to the Board of Agriculture in England, as a wonderful discovery in mathematics." (*Communications to the Board of Agriculture*, vol. vi. p. 437.)

According to another writer, the Rotherham plough was first constructed in Yorkshire in 1720, about ten years before Lummis's improvements. (*Survey of the West Riding of Yorkshire.*)

Small's plough.

But the present improved swing-plough was little known in Scotland till about the year 1764, when Small's method of constructing it began to excite attention. This ingenious mechanic formed the mould-board upon distinct and intelligible principles, and afterwards made it of cast-iron. His appendage of a chain has been since laid aside. It has been disputed whether he took the Rotherham or the old Scotish plough for the basis of his improvements. The swing-plough has been since varied a little from Small's form, for the purpose of adapting it more completely to particular situations and circumstances. Of late it has been made entirely of iron. See Plate V.

Wheel-ploughs.

Wheel-ploughs, used in many parts of England, are also constructed in a great variety of forms. Their chief recommendation is, that they require less skill in the ploughman; but it is admitted, that the friction caused by the wheels adds to the resistance, and that they are more expensive, and more liable to be put out of order, as well as to be disturbed in their progress by clods, stones, and other inequalities, than those of the swing kind. Wheel-ploughs, says Dr Dickson (*Practical Agriculture*, vol. i. p. 7.), should be seldom had recourse to by the experienced ploughman, though they may be more convenient and more manageable for those who are not perfectly informed in that important and useful art.

The Hertfordshire and Kentish *turn-wrest* wheel-plough, as well as the swing-plough, are described by Blythe; and they do not seem to have received much improvement since his time. The former is thought most suitable for general purposes on stiff tenacious soils, and the latter where very deep ploughing is required.

On light, loamy, and friable soils, where deep ploughing is not necessary, the *Norfolk wheel-plough* will be found convenient and useful: it is compact and light in its form, doing its work with neatness, and requiring only a small power of draught.

Skim coulter.

To the improved common wheel-plough an iron earth-board, firmly screwed to the coulter, has been lately added. It is made use of when ploughing turf, which it takes off by itself, and turns into the furrow, immediately covering it with earth. It is observed that, by this management, turf at one ploughing has the appearance of a fallow, and harrows nearly as well; but more strength is required in the team. A similar sort of skim coulter may be added to any other plough, and may be useful in turning down green crops and long dung, as well as in trench-ploughing. But in most instances it is thought a preferable plan, where the soil has to be stirred to an unusual depth, to make two common swing-ploughs follow each other in the same track; the one before taking a shallow furrow, and the other going deeper, and throwing up a new furrow upon the former.

Two-furrow ploughs.

Two-furrow ploughs are used in a few places, but are not likely ever to become general. They are constructed either with or without wheels. A plough of this kind was strongly recommended by Lord Somerville, and used by his lordship and others, apparently with some advantages. In Blythe's *Improver Improved*, there is an engraving of this plough also. But with all the improvements made by Lord Somerville, it can never come into competition for general purposes with the present single furrow ploughs; and he admits that it would be no object to invade the system already established in well-cultivated counties; though, where large teams are employed, with a driver besides the ploughman, it would certainly be a matter of importance to use this plough, at least on light friable soils. "Their horses," he says, "will not feel the difference between their own single furrow working one acre, or the well-constructed two-furrow plough with two acres per day; here is no system deranged, and double work done." (*Communications to the Board of Agriculture*, vol. ii. p. 418.)

Two, three, and four furrow ploughs.

Amos, already mentioned, has gone much beyond this. In his Essay in the Board's Communications formerly referred to, he gives a description, with an engraving, of a machine which combines "two, three, or four ploughs together, for ploughing furrows nine by five inches square." On soils of a tenacity next to clay, "six horses will draw four ploughs, four horses three ploughs, and three horses two ploughs, and every plough to plough an acre a day." It is scarcely necessary to add, that such machines are altogether unfit for agricultural operations; the nature and condition of the soil and surface, varied in ways innumerable, will never permit the general use of them; and even in the few situations where they may be employed, there is reason to believe that ploughing cannot be done cheaper, and certainly not so well as by the two-horse single furrow plough.

Miner, &c.

Various other implements under the name of ploughs have been constructed for stirring the soil;—such as the *Miner*, for following in the furrow of a common plough, and loosening the ground to a greater depth, without bringing up the subsoil; the *Paring Plough*, and the *Mole* and other sorts of ploughs for draining, some of which shall be afterwards noticed under their proper heads.

Self-cleaning plough.

A plough has been recently constructed by Mr John Finlayson, farmer at Muirkirk, which is found well adapted to coarse old swards. It is called the rid or self-cleaning plough, from its clearing itself from obstructions without often requiring the aid of the ploughman; and it turns over the furrow in a complete and workman-like manner in situations where it falls back after the common plough, notwithstanding the utmost exertions of the ploughman. It has been tried in various situations both in England and Scotland, and given much satisfaction to very competent judges; but it does not seem to possess any advantages over the common plough upon land under a regular course of cultivation. See Plate VI.

Dynamometers.

Several inventions are in use for ascertaining and comparing the power required to work the plough in different situations. These are known by the name of dynamometers, or draught machines; and they all agree in this, that the power is determined by a movable index pointing to figures denoting hundredweights on a dial-plate. The difference in the power necessary even upon the same soil, according to the construction of the plough, is greater than might be expected, varying upon cultivated land free from obstructions from three to five hundredweights and upwards. See Plate IX. (*Prize Essays and Transactions of the Highland Society of Scotland*, vol. iv.)

2. *Cultivator and Grubber.*

Cultivator.

The plough, as is well known, covers the old and exposes a new surface; but as that is not always necessary, other implements are in use for stirring and pulverizing the soil without turning it over. Some of them are used in preparing it for the seed, and others, as horse-hoes, between drilled crops. It were to no purpose to enumerate and describe all these; we shall here notice only such as we know to be of practical utility. One of them, called a *grubber*, from its efficiency in bringing weed-roots to the surface, consists of two strong rectangular frames, the one including the other, and nine bars mortised into the inner one, with eleven coulters or tines with triangular sharp-edged dipping feet, four cast-iron wheels, two handles, &c. See Plate V. All the coulters are fixed in these bars except two, which are placed in the side beams of the outer frame, and may be set to go more or less deep by means of pins and wedges. It is useful in stirring land on which potatoes or turnips have grown, or that has been ploughed in autumn or during winter, so that a crop may be sown in spring without further use of the plough. It works as deep as the plough has gone, and, by the reclined position of the coulters, brings to the surface all the weed-roots that lurk in the soil. Beans and peas have been sown in spring on the winter furrow, after being stirred by the grubber; and barley also, after turnip, without any ploughing at all. In working fallow it is used with good effect in saving one, two, or more ploughings. This implement is made of different sizes, and may be worked either by four or by two horses.[1]

Grubber.

3. *Harrows.*

Common Harrows.

The harrows most generally used are of an oblong shape, each containing twenty tines, five or six inches long beneath the *bulls* or bars in which they are inserted. It is still common for every harrow to work separately; and though always two, and sometimes three harrows are placed together, each of them is drawn by its own horse. The great objection to this method is, that it is scarcely possible, especially upon rough ground, to prevent the harrows from starting out of their place, and *riding* on one another. To obviate this inconvenience, the exterior bulls of each are usually surmounted by a frame of wood, raised so high as to protect it from the irregular motions of its neighbour; but in many instances they are connected by chains, or hinges, or cross bars, which is a preferable plan. Another objection which has been made to the common harrows is, that the ruts made by the tines are sometimes too near and sometimes too distant from one another; but this is probably not a great fault when the soil requires to be pulverized as well as the seed covered, especially when they are permitted to move irregularly in a lateral direction. Where the soil is already fine, as it ought always to be before grass seeds are sown, lighter harrows are used, which are so constructed, that all the ruts are equidistant. See Plate V.

Brake.

The *brake*, as commonly constructed, is nothing more than a heavier harrow, sometimes in one, and sometimes in two pieces joined together; the tines being in number and length, and in the distance from one another at which they are placed, suited to the nature of the soil on which it is employed.

Revolving harrow.

Within these few years, two harrows have been brought into use, which seem to be most efficient implements, especially where the soil abounds in weed-roots. The first of them is the invention of Mr Samuel Morton, agricultural implement maker, Edinburgh, and is called the *Revolving Brake Harrow*. When the soil has been sufficiently reduced, this is perhaps the best implement of any for bringing the roots to the surface; and to a certain extent it also acts in pulverizing the land when under fallow, so as to save one or two ploughings. See Plate VI. (*Farmer's Magazine*, vol. xviii. &c.)

Finlayson's harrow.

The other has been constructed by Mr Finlayson, the inventor of the self-cleaning plough already mentioned; and is also a very powerful implement. See Plate VI.

4. *Drill-Machines.*

Drills.

The purpose of these ingenious but often too complicated machines is, to deposit the seed in equidistant rows on a flat surface; on the top of a narrow ridge; in the interval between two ridges; or in the bottom of a common furrow. Corn when drilled is usually sown in the first of these ways, turnips in the second, and peas and beans in the third or fourth. One of the best for sowing all kinds of corn was invented by Mr Bailey of Chillingham,[2] who has paid great attention to the construction of agricultural implements, and applied to their improvement his knowledge both as a mathematician and agriculturist. The practice of drilling corn does not, however, seem to be gaining ground; and even where it is found of advantage to have the plants rise in parallel rows, as must always be the case where hand-hoeing is required, this is sometimes done by means of what is called *ribbing*, a process which will be afterwards described, as more convenient in many cases than sowing with a drill-machine.

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[1] In a work recently published by General Beatson, a small kind of hoe has been much recommended, which produces the required effect by successive operations, going at first shallow, and then deeper and deeper, as may be found necessary, or as the soil will permit.

[2] See *Essay on the Construction of a Plough deduced from Mathematical Principles*; and *Northumberland Report*, p. 48. edit. 1800.

In Scotland, turnips are universally sown with a drill-machine, on ridges 27 or 30 inches broad, usually formed by one *bout* of a common plough. When turnips are extensively grown, the machine is made to sow two of these ridges at once, and two rollers are attached to it, one for smoothing the tops of the ridges before the seed is deposited, and the other for compressing the soil and covering the seed. The front roller is now made concave, which leaves the ridges in a better form for the seed. It is drawn by one horse walking between the ridges, and requiring no other driver than the person who guides the machine, which is simple in its construction, and most expeditious in its operation. See Plate VII.

Beans and peas, when sown in rows, are either deposited in the space between two ridgelets, which are afterwards reversed to cover them, or in the bottom of a furrow made by a common plough,—in Scotland, usually in that of every third furrow. The implement in most common use for this purpose is extremely simple, and is either wheeled forward by a man, or attached to the common plough itself.

5. *Horse-Hoes.*

Horse-hoes.

The interval between the rows of drilled turnips, potatoes, and beans and peas, being commonly from 2 to 2½ feet, admits the employment of a horse-hoe or hoeing-plough. Of this kind of machine there are a great many varieties. A very good one is described in the Northumberland Report, p. 43; the body is of a triangular form, and contains three coulters and three hoes, or six hoes, according to the state of the soil. A hoe of the same kind is sometimes attached to a small roller, and employed between rows of wheat and barley, from 9 to 12 inches distant; it is also used in place of a cultivator, in preparing bean stubbles for wheat in autumn, and in pulverizing lands for barley in spring.

Small plough and horse-hoe in one.

Another implement, which serves both as a double mould-board plough and a horse-hoe, is much approved of in the culture of drilled crops; and with some slight alterations it may be also employed as a small plough for taking the earth from the sides of the ridgelets. When it is used as a horse-hoe, the mould-boards are taken off, and two curved cutters or coulters expand from the beam on each side, to a less or greater distance, according to the width of the interval between the plants, and approach each other in the bottom of the furrow, where the share supplies their place. This machine is well adapted for light soils, and can be set to work very near the rows of plants; it is particularly useful in cutting up annual weeds preparatory to hand-hoeing, which it greatly facilitates. When it is to be employed as a single or double mould-board plough, the cutters are withdrawn. A very complete implement, answering these different purposes, is known under the name of Morton's *Universal Drill-Plough and Harrow*, which is found very convenient in the hands of skilful ploughmen, and seems well suited for the use of small farms, or situations where a variety of implements is not often required; so many of these being combined in one, and admitting of being easily separated and used each by itself. See Plate VII.

Universal drill-plough and harrow.

6. *Rollers.*

Rollers.

These are constructed of wood, stone, or cast-iron, and of different dimensions, according to the purposes for which they are used. The *spike-roller* is employed in some places when the soil rises in large masses, difficult to be reduced. The Norfolk *drill-roller*, on which rings of iron are fixed at small distances, is considered a useful implement, as, by forming parallel ruts into which the seed falls, with small ridges between, the seed is better covered than by harrowing alone. But rollers are chiefly used for the purpose of smoothing and compressing the soil and breaking down clods; and their weight is varied accordingly. See Plate VII.

7. *Horse-Rakes.*

Horse-rakes.

In those districts where corn is cut with the scythe, the horse-rake is found to be a useful implement for saving manual labour; it is also used for hay. The teeth are of iron, 14 or 15 inches in length, and set five or six inches distant. Its construction is very simple. A man and horse are said to be capable of clearing from 20 to 30 acres in a moderate day's work, disposing the grain in lines across the field, by lifting up the rake and dropping it from the teeth, without stopping the horse. One of these has been lately used in the neighbourhood of Edinburgh for raking hay, and has given much satisfaction. See Plate VI.

8. *Threshing-Machines.*

Threshing-machines.

Threshing-machines are now common in every part of Scotland, on farms where the extent of tillage land requires two or more ploughs; and they are every year spreading more and more in England and Ireland. They are worked by horses, water, wind, and of late by steam; and their powers and dimensions are adapted to the various sizes of farms. Water is by far the best power; but as a supply cannot be obtained in many situations, and as wind and steam require too much expense for most farms, horses are still employed more generally than any other power. Where wind-mills are erected, it is found necessary to add such machinery as may allow them to be worked by horses occasionally, in very calm weather; and the use of steam must be confined for the most part to the coal districts.

Travelling-shaker.

All the essential parts of this machine will be noticed in describing the engraving (Plate IX.), though several slight alterations are occasionally introduced. One of the most useful of these, perhaps, is the method of delivering the straw, after it has been separated from the corn by the circular rake, to what is called a *travelling-shaker*, which carries it to the straw-barn. This shaker, which revolves like the endless web formerly used for conveying the corn to the beaters, is composed of small rods, placed so near as to prevent the straw from falling through, while any threshed corn that may not have been formerly separated drops from it in its progress, instead of falling along with it, where it would be trodden down and lost.

It is well known that the work of horses at threshing-mills is unusually severe, if continued for any length of time; that they sometimes draw unequally; that they, as well as the machine itself, are much injured by sudden jerks and strains, which are almost unavoidable; and that, from this irregularity in the impelling power, it requires much care in the man who presents the corn to the rollers, to prevent bad threshing. It is therefore highly desirable that the labour should be equalized among the horses, and the movements of the machine rendered as steady as possible. A method of yoking the horses in such a manner as compels each of them to take his proper share of the labour has accordingly been lately introduced, and the necessary apparatus, which is neither complicated nor expensive, can be added to any machine worked by animal power. (*Farmer's Magazine*, vol. xiii. p. 279.) See Plate IX.

All well-constructed threshing-mills have one winnowing-machine, which separates the chaff from the corn before it reaches the ground; and a second sometimes receives it from the first, and gives it out ready for market, or nearly so; the work done varying with the power and the kind of grain from three to six or eight quarters in the hour. If the height of the building does not admit of this last addition, a separate winnowing-machine, when the mill is of great power, is driven by a belt from it. In either of these ways there is a considerable saving of manual labour. And with a powerful water-mill, it cannot be doubted that corn is threshed and dressed at no more expense than must be incurred for dressing alone when threshed with the flail. Besides, the corn is more completely detached from the straw; and, by being threshed expeditiously, a good deal of it may be preserved in a bad season which would have spoiled in a stack. The great advantage of transferring forty or fifty quarters of grain in a few hours, and under the eye of the owner, from the yard to the granary or market, is of itself sufficient to recommend this invaluable machine, even though there were no saving of expense.

Hand threshing-mill. A machine of this kind, which is worked by one or two men, may probably be found useful on small farms. It is made for L.8 or L.10, and is said to thresh ten or twelve bushels in an hour. (*Id.* p. 409.) In some parts of England portable machines are in use, and carried from one farm to another, like any common implement.

9. *Winnowing-Machine.*

Winnowing-machine. This is said to be of Chinese invention, and to have been brought to Europe by the Dutch, from whom it reached Scotland in the early part of the last century. They were first made by a person of the name of Rodgers, near Hawick, in Roxburghshire, who happened to see one in a granary at Leith in the year 1733, though it would appear that one had been brought from Holland to East Lothian, along with a barley-mill, twenty-two years before. Yet it does not seem to have been then known to farmers, nor did it come into general use till long after 1733; and in some parts of England and of the north of Scotland it is not employed even at this day. Two men and three women will dress and measure up into sacks, in about ten hours, from twenty to twenty-five quarters of corn, by means of this machine.

10. *Chaff-Cutter, and similar Implements.*

Chaff-cutter. Chaff-cutters may be either wrought separately by manual labour, or by being attached to some other machine. This implement, like the operation it performs, is sufficiently simple, though its construction is various. Macdougal's patent chaff-cutter is understood to be one of the most useful of the kind, and may be easily repaired, when necessary, by any common mechanic. Turnip-slicer. Another tool of a similar description is partially used for cutting turnips, which is often an advantageous practice, especially in feeding sheep of a year old in spring, after they have cast their first teeth. Machines for cutting or bruising corn. Various contrivances are also adopted by some farmers for cutting or bruising corn for horses, which ought to become a more general practice, particularly for old horses, and such as swallow their corn without mastication. Steaming apparatus. Akin to these inventions is the *steaming apparatus*, which should be considered a necessary appendage to every arable and dairy farm of a moderate size. The advantages of preparing food for live stock by means of steam begin now to be generally and justly appreciated.

11. *Wheel-Carriages.*

Waggons. *Waggons*, though they may possess some advantages over carts in long journeys, and when fully loaded, are now admitted to be much less convenient for the general purposes of a farm, and particularly on occasions which require great dispatch, as in harvesting the crop. According to Marshall, the waggons used in Gloucestershire are the best in England. (*Rural Economy of Gloucestershire.*) In some places the *improved Irish car* is employed for light loads, while the waggon continues to be used for other purposes.

Carts. *Carts*, drawn by one or two horses, are, however, the only farm-carriages of some of the best cultivated counties, and no other are ever used in Scotland. Their load depends upon the strength of the horses and nature of the roads; but in every case, it is asserted that a given number of horses will draw a great deal more, according to some one-third more, in single-horse carts than in waggons. Two-horse carts are still the most common among farmers in Scotland; but those drawn by one horse, two of which are always driven by one man, are unquestionably preferable for most purposes. The carriers of the west of Scotland usually load from a ton to a ton and a half on a single-horse cart, and nowhere does it carry less than 12 cwts. if the roads are tolerable.

Corn and hay cart. For corn in the straw, and hay, the farmers of the south of Scotland and north of England use a sparred frame, which is made to fit the same wheels from which the close body of the cart is removed. In other places the close body is retained, and movable rails attached to it for these loads. See Plate VI.

Coup-cart. Carts are varied in their construction to suit different purposes. A very convenient carriage for home work, called a *coup-cart*, discharges its load with great ease and expedition; the fore part of the close body being made to rise up from the shafts on drawing out an iron pin, while the other end sinks, and allows the load to fall to the ground.

Broad wheels. *Broad wheels*, with conical or convex rims, are common in England; in Scotland the wheels are generally narrow, though broader ones are beginning to be introduced. Those used for the common or two-horse carts are usually about 4½ feet high, and mounted on iron axles. The advantages of broad cylindrical wheels have been illustrated with much force and ingenuity in several late publications. (*Communications to the Board of Agriculture*, vol. ii. and vol. vii. Part i.)

12. *Reaping-Machines.*

Reaping-machines. An implement capable of performing the process of reaping corn is yet a *desideratum* in agricultural machinery, but which will probably be supplied, at least for favourable situations, at no distant period. In all field operations, dispatch, in such a climate as this, is a matter of great importance; but in reaping corn at the precise period of its maturity, the advantages of dispatch are incalculable, especially in those districts where the difficulty of procuring hands, even at enormous wages, aggravates the danger from the instability of the season. It cannot, therefore, fail to be interesting, and we hope it may be also useful, to record some of the more remarkable attempts that have been made towards an invention so eminently calculated to forward this most important operation.

Mr Boyce's. The first attempt of this kind, so far as we have learned, was made by a Mr Boyce, who obtained a patent for a reaping-machine about 30 years ago. This machine was placed in a two-wheeled carriage, somewhat resembling a common cart, but the wheels were fixed upon the axle, so that it revolved along with them. A cog-wheel within the carriage turned a smaller one at the upper end of an inclined axis, and at the lower end of this was a larger wheel, which gave a rapid motion to a pinion fixed upon a vertical axis in the fore part of the carriage, and rather on one side, so that it went before one of the wheels of the carriage. The vertical spindle descended to within a few inches of the surface of the ground, and had there a number of scythes fixed upon it horizontally.

This machine, when wheeled along, would, by the rapid revolution of its scythes, cut down a portion of the corn growing upon the ground over which it passed; but having no provision for gathering up the corn in parcels and laying it in proper heaps, it was wholly unfit for the purpose.

Mr Plucknet's.

An agricultural implement maker of London, Mr Plucknet, attempted some years afterwards to improve this machine. The principal alteration he made was in substituting for the scythes a circular steel plate, made very sharp at the edge, and notched on the upper side like a sickle. This plate acted in the same manner as a very fine-toothed saw, and was found to cut the corn much better than the scythes of the original machine.

Mr Gladstones's.

A description and drawing of a machine, invented by Mr Gladstones of Castle Douglas, in the stewartry of Kirkcudbright, are given in the *Farmer's Magazine*, vol. vii. p. 273. It operated upon nearly the same principles with Mr Plucknet's; but Mr Gladstones made it work much better by introducing a circular table, with strong wooden teeth notched below all around, which was fixed immediately over the cutter, and parallel to it. The use of these teeth was to collect the corn and retain it till it was operated on by the circular cutter. The corn when cut was received upon this table, and, when a sufficient quantity was collected, taken away by a rake or sweeper, and laid upon the ground beneath the machine, in separate parcels. To this machine was added a small circular wheel of wood covered with emery, which, being always in contact with the great cutter at the back part, or opposite side to that where the cutting was performed, kept it constantly ground to a sharp edge.

Mr Salmon's.

The next attempt was made by Mr Robert Salmon of Woburn, Bedfordshire, whose invention, it is said, promised better than those we have mentioned. It was constructed upon a totally different principle, as it cut the corn by means of shears; and it was provided with a very complete apparatus for laying it down in parcels as it was cut.

Mr Smith's.

One of the most promising machines of this kind of which we have received any account, was constructed by Mr Smith, of the Deanston Cotton Works, Perthshire. He made the first trial of it upon a small scale, during the harvest of 1811. It was then wrought by two men. In 1812 he constructed one upon a larger scale, to be wrought by a horse; but though he cut down several acres of oats and barley with considerable ease, it was found that, when met by an acclivity, the horse could not move the machine with proper effect. In 1813 he made a more successful attempt with an improved machine, worked by one man and two horses; and in 1814 it was still further improved by an additional apparatus, tending to regulate the application of the *cutter* when working on an uneven surface.

The *cutter* of this machine is circular, and operates horizontally; it is appended to a drum connected with the fore part of the machine, its blade projecting some inches beyond the periphery of the lower end of the drum (See Plate VIII.); and the machine is so constructed as to communicate, in moving forward, a rapid rotatory motion to this drum and cutter, by which the stalks are cut, and, falling upon the drum, are carried round and thrown off in regular rows. This ingenious piece of machinery will cut about an English acre per hour, during which time the cutter requires to be four times sharpened with a common scythe-stone. The expense is estimated at from L.30 to L.35. If properly managed, it may last for many years, only requiring a new *cutter* every two or three years; a repair which cannot cost much. But we are sorry to learn that, after some not unsatisfactory trials, Mr Smith has not found it convenient to prosecute his invention.

Bell's reaping-machine.

A more recent attempt has been lately made by Mr Patrick Bell, A. M. His machine was tried at Gowrie, in the county of Forfar, in the month of September 1829, in cutting down oats, barley, and wheat, on ground of uneven surface and considerable declivity. It is about five feet broad, and consequently cuts down this breadth of corn as it moves onward. The stubble left was from three to four inches high; and the cut corn was deposited as the machine advanced, in a very regular manner. It was worked by one horse, and may cost about L.30, the work done being at about the rate of an imperial acre in the hour. In the opinion of the farmers and others present at this trial, this machine will come immediately into general use, and confer a signal benefit on agriculture. (*Quarterly Journal of Agriculture, &c.* No. III. p. 331.)

Hainault scythe.

The Flemish or Hainault scythe has been tried at different times, and recommended as a better implement for reaping corn than the sickle or scythe in common use; and it was lately brought fully before the public, under the patronage of the Highland Society of Scotland. At the request of this society, M. Masclet, late French consul at Edinburgh, brought over two young men from Flanders to show the use of this implement, and to instruct our own labourers. The trials were made, after public notice, in several parts of Scotland, with the different varieties of grain, and under different circumstances as to the state of the crop at the time; and the results seem to be very much in its favour. The straw was cut nearly as close as with the common scythe, taken up clean except where the crop was very thin, and laid down regularly in a proper state for binding and threshing. A man will cut with this implement two roods or half an acre a day; and the saving has been calculated as equal to about one-third of what would be required to cut the same crop by the sickle now in use. See Plate VI.

Sickle and hook.

Still, however, the most common implement for reaping is either the teethed hook or the smooth sickle, sometimes called the scythe-hook. It has been disputed which of these is preferable. The sickle cuts the straw like a scythe, and where the crops are strong, there can be no doubt that the work is performed with much less labour, and the crop taken up equally clean as by the teethed hook. But where the crop is thin and straggling, some of the stalks drop to the ground as they are cut, instead of being gathered and taken up, as they would have been by the teethed hook.

We have thus noticed all the most important implements in general use, and shall have occasion, under the proper heads, to advert to some others that are only employed occasionally. Our limits require us to pass over those of a more simple kind, which are well known, and may be found fully described in a variety of publications. (See *Communications to the Board of Agriculture*, the *County Reports*, and the *General Report of Scotland*.)

SECT. II. FARM-HOUSES.

Farm-houses.

Suitable farm-buildings are scarcely less necessary to the husbandman than implements and machinery, and might, without much impropriety, be classed along with them, and considered as one great stationary machine, operating more or less on every branch of labour and produce. There is nothing which marks more decidedly the state of agriculture in any district than the plan and execution of these buildings.

In erecting farm-houses, the first thing that deserves notice is their situation, both in regard to the other parts of the farm, and the convenience which they ought themselves to possess. In general, it must be of importance on arable farms, that the buildings should be set down at nearly an equal distance from the extremities; or so situate that the access from all the different fields should be easy, and the distance from those most remote no greater than the size of the farm renders unavoidable. The advantages of such a position in saving labour are too obvious to require illustration; and yet this matter is not nearly so much attended to as its importance deserves. In some cases, however, it is advisable to depart from this general rule, of which one of the most obvious is, when a command of water for a threshing-mill and other purposes can be better secured in another quarter of the farm.

The form most generally approved for a set of offices is that of a square, or rather a rectangular parallelogram, the houses being arranged on the north, east, and west sides, and the south side fenced by a stone wall, to which low buildings for calves, pigs, &c. are sometimes attached. The space thus inclosed is usually allotted to young cattle: these have access to the sheds on one or two sides, and are kept separate, according to their size or age, by one or more partition-walls. The farmer's dwelling-house stands at a short distance from the offices, and frequently commands a view of the inside of the square; and cottages for servants and labourers are placed on some convenient spot, not far from the other buildings.

The number and arrangement, as well as the size of the different houses, must depend in some degree on the extent of the farm and the general management. It is therefore only necessary to notice particularly those which are indispensable in every case on an arable farm, and the degree of accommodation they should afford.

Barn. The *barn* is always set down so as to be as convenient as possible for the stack-yard, wherever corn is put up in stacks instead of being immediately carried from the field to the barn itself. Relatively to the other buildings, its situation may be varied according to circumstances; but two things should be attended to; first, its contiguity to the granary; and, second, its facility of access for furnishing straw to the cattle-houses. In the plan delineated in Plate VI., it is placed in the middle of the north range, with one end projecting into the stack-yard, and the other, where the straw is lodged, on a line with stables on one side, and cattle-houses on the other, and having a door opening towards the straw-yards. As it is to be understood throughout this description that a threshing-mill is employed, a width of from 20 to 30 feet within walls, on the length of this side of the square, will generally be sufficient for the straw-house. The height of the barn must be such as to allow at least one winnowing-machine to be attached to the mill, and its length is determined by the size of the farm.

Granary. A *granary* is an indispensable accommodation on all tolerably large farms, and is commonly, though in many cases improperly, placed above the cart-sheds, to be afterwards noticed. From experience and observation, we would recommend that the granary should be under the roof of the barn, immediately above the floor on which the machine works; and that the corn should be raised to it from the ground-floor either by the threshing-mill itself, or a common windlass, easily worked by one man. When it is to be taken out and carried to market, it may be lowered down upon carts, with the utmost facility and dispatch. There is evidently no greater expense incurred by this arrangement, for the same floor and height of side-walls that must be added to the barn are required in whatever situation the granary may be, and it possesses several advantages. Owing to its being higher than the adjacent buildings, there is a freer circulation of air, and less danger of pilfering, or of destruction by vermin; the corn can be deposited in it as it is dressed, without being exposed to the weather; while the saving of labour is in most cases considerable. This plan has been lately recommended by several agricultural writers,[1] and has been found exceedingly convenient in practice.

Stables. *Stables* are now constructed in such a manner that all the horses stand in a line with their heads towards the same side-wall, instead of standing in two lines, fronting opposite walls, as formerly. Those lately erected are at least sixteen feet wide within walls, and sometimes eighteen, and the width of each stall upon the length of the stable is commonly five feet. To save a little room, stalls of nine feet are sometimes made to hold two horses; and in that case the manger and the width of the stall are divided into equal parts by what is called a half-trevice, or a partition about half the depth of that which separates one stall from another. By this contrivance, each horse indeed eats his food by himself; but the expense of single stalls is more than compensated by the greater ease, security, and comfort of the horses. The trevices, or partitions which divide the stalls, are of deals two inches thick, and about five feet high; but at the heads of the horses the partition rises to the height of seven feet, and the length of the stall is usually from seven to eight feet.

The manger is generally continued the whole length of the stable. It is about nine inches deep, twelve inches wide at the top, and nine at the bottom, all inside measure, and is placed about two feet four inches from the ground. Staples or rings are fixed in the breast of the manger, to which the horses are tied.

The rack for holding their hay or straw is also commonly continued the whole length of the stable. It is formed of upright spars, connected by cross rails at each end, and from two to two and a half feet in height. The rack is placed on the wall, about one foot and a half above the manger, the bottom almost close to the wall, and the top projecting outwards so as to form an angle with it of twenty or twenty-five degrees. The spars are sometimes made round, and sunk into the cross rails, and sometimes square. In a few stables lately built, the round spars turn on a pivot, which facilitates the horse's access to the hay, without requiring the interstices to be so wide as to permit him to draw it out in too large quantities.

Immediately above the racks is an opening in the hay-loft, through which the racks are filled. When it is thought necessary, this may be closed by boards moving on hinges.

Behind the horses, and about nine feet from the front wall, is a gutter, having a gentle declivity to the straw-yard or urine-pit. Allowing about a foot for this, there will remain a width of eight feet to the back wall, if the stable be eighteen feet wide; a part of which, close to the wall, may be occupied with corn-chests and places for harness.

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[1] Dickson's *Practical Agriculture*, vol. i. p. 46; and *General Report of the Agricultural State of Scotland*, vol. i. p. 141.

In some of the best stables the racks occupy one of the angles between the wall and trevices, and form the quadrant of a circle. The spars are perpendicular, and wider placed than in the hanging racks. The hay-seed falls into a box below, instead of being dropped on the ground, or incommoding the eyes and ears of the horses.

With a view to save both the hay and the seed, it is an advantage to have the hay-stack so near the stable as to admit of the hay being thrown at once upon the loft. In some stables there is no loft, and the hay is stored in a separate apartment. The floor is, for the most part, paved with undressed stones; but, in some instances, the space from the gutter to the back wall is laid with flags of freestone.

Cattle-houses.

According to the plan we are describing, *cattle-houses* are placed on the other side of the straw-house, and, with a root-house, complete the north side of the square. The extent of these, it is evident, depends not only on the size of the farm, but on the general management, and must vary according as rearing, fattening, or dairy cattle, form the principal object. To avoid prolixity, let it be understood that this part of the range is allotted to fattening cattle. There are three ways in which the cattle are placed; first, in a row towards one of the side walls; second, in two rows, either fronting each other, with a passage between, or with their heads towards both side walls; and, third, across, or upon the width of the house, in successive rows, with intervening passages for feeding and removing the dung. In the first plan it is usual to have openings in the walls, through which they are supplied with turnips, otherwise they must necessarily be served from behind, with much inconvenience both to the cattle-feeder and the cattle themselves. The plan that is most approved of, and which is now becoming general when new buildings are erected, is to fix the stakes to which the cattle are tied about two and a half or three feet from the wall; which allows the cattleman, without going among them, to fill their troughs successively from his wheelbarrow or basket with much ease and expedition. It is also a considerable improvement to keep the cattle separate by partitions between every two. This will in a great measure prevent accidents, and secure the quiet animals from being injured by the vicious; for, in these double stalls, each may be tied up to a stake placed near the partition, so as to be at some distance from his neighbour; and it is easy to lodge together such as are alike in size and in temper. The width of such stalls should not be less than 7½ feet, and the depth must be regulated by the size of the cattle.

Root-house.

Wherever a number of cattle are fed, an apartment is required for containing turnips, potatoes, &c. when brought from the field, until they are dealt out into the troughs. This apartment is placed either on the line of the cattle-houses, or begins another side of the square, at the angle of the junction of the two sides. The outer door ought to be so large as to admit a loaded cart; and there is an inner door that opens into the feeder's walk along the heads of the cattle. At the other end of this, a door opens into the straw-house; so that their food and litter are not exposed to the weather, and the labour of the feeder is greatly diminished.

Cattle and cart-sheds.

The east and west sides of the square consist chiefly of sheds for the straw-yard cattle, and cart-sheds. But stables for young horses, riding-horses, and for separating the sick from the others, may be placed upon that side which connects with the common stable already described; and, in like manner, a part of the opposite side, connecting with the cattle-houses, may be allotted to cows; or, if necessary, the feeding-houses may be continued. The cattle-sheds are open towards the straw-yards, and the cart-sheds outwards to the road. On one of these sides there should be a close apartment for small tools, and another for preparing corn and roots by steam, which may also serve for other purposes. In some convenient place near the stables and cattle-houses, or immediately over them, there should be sleeping-rooms for the servants who have the charge of them, that they may be at hand in case of accidents during the night.

Hog-styes and poultry-houses.

Along the wall which completes the inclosure, such low buildings may be set down, particularly hog-styes and poultry-houses, as may be thought desirable. These styes should open behind into the straw-yards, to which the hogs should have access for picking up corn left on the straw, and such turnips, clover, &c. as are refused by the cattle. When they are kept in great numbers, it may be necessary to allot them a range of styes, with yards in front, in another place, as is commonly done by gentlemen farmers; but it is absurd fastidiousness in a rent-paying farmer to exclude these profitable animals from a place where a few of them will make themselves fat without a shilling of expense, and without any real injury to the cattle among which they feed.

It will be seen from the engraving (Plate XI.), that a road, which should be always kept in good order, goes along three sides of this square, from which there is access to the houses, instead of entering through the straw-yards from the inclosed area. All the houses in which live stock are kept have an opening behind towards the straw-yards, for carrying out their dung.

This plan, which, with slight variations, required by circumstances, is common in the north of England and south of Scotland, is meant to combine convenience with economy, and is well adapted to most arable farms in the occupancy of tenants. Proprietors who farm, sometimes choose to add several other buildings, and at the same time to vary a little their distribution. Thus, it is common to separate the straw-yards from the sides of the square by a cart-way, towards which all the doors open, and the hog-styes with yards are usually placed behind one of the sides where they are least exposed to observation.

Watering-troughs.

In every case, it is absolutely necessary that there should be water in or near the area. In the plan delineated in Plate XI. a pump is placed at the end of the wall which divides the area, and along this wall are fixed troughs, to which the cattle on each side have access at all times.

Urine-pit.

When a great number of cattle are fed at the stake, it is necessary to have a reservoir near the square to receive their urine. The urine is either applied to the land in its liquid state, or earth, peat-moss, &c. is thrown into the pit in such quantities as may be necessary to absorb it. Sometimes the reservoir is sunk below the area, and the urine raised by a pump, and spread over the straw-yard. But on those arable farms where no more cattle are reared or fattened, and no more turnips consumed at the homestead, than what are needed for converting the straw into manure, a reservoir for urine is not required, the whole of it being absorbed by the straw as it is dropped.

Hammels.

The practice of feeding cattle in small sheds and straw-yards, or what are called *hammels* in Berwickshire, deserves to be noticed with approbation, when saving of expense is not a paramount object. Two cattle are usually kept together, and go loose, in which way they are thought by some to thrive better than when tied to a stake, and, at the same time, feed more at their ease than when a number are kept together, as in the common straw-yards. All that is necessary is, to run partition-walls across the sheds and yards already described; or if these are allotted to rearing stock, one side of the square, separated by a cart-way from the straw-yards, is appropriated to these hammels.

Smith's and wright's shops.

On large farms, a smith's and a wright's shop are found exceedingly convenient, even though used only one or two days a week. Much time is lost in going to a distance to the residence of these necessary mechanics; and it is now not uncommon to have houses furnished with the necessary accommodations on farms of this description, where the smith attends at stated intervals, and the wright when wanted. It is better to set down these houses at a little distance, than to place them on the square, whence, among other inconveniences, the danger from fire is a sufficient reason for excluding them.

Cottages.

The cottages for farm-servants, which are usually set down in a line, at not an inconvenient distance from the offices, ought to contain each of them at least two apartments with fire-places, though in some of the best cultivated counties there is only one chimney, and no other division than what is made by the furniture. But better accommodation for this useful and meritorious class is now generally allowed in erecting new buildings. Every cottage has a small kitchen-garden adjoining; and as farm-servants in the southern counties of Scotland have each of them a cow, kept all the year on the farm as part of their wages, it is common to attach a byre for them to the range of cottages, and sometimes also hog-styes and apartments for fuel.

Dwelling-house.

It is unnecessary to say any thing of a farmer's dwelling-house, as the size and accommodations are very little different from those of other dwelling-houses possessed by people of the same property or income. It is only on dairy farms that particular apartments are necessarily appropriated to the business of a farm; and these shall be described under a separate article. See DAIRY.

Most of the farm-buildings recently erected in the best cultivated counties are covered with slate. A thatched roof is still common for cottages, though for these also slate is beginning to be preferred. One cause of the comparative sterility of land in former times, was the great quantity of straw that was withdrawn from the food or litter of cattle, and used as thatch, instead of being converted into manure.

Repairs.

Tenants holding on leases for a term of years are usually taken bound to keep all the houses on a farm in sufficient repair during their occupancy, and to leave them so at their removal, having received them in such a state at their entry. It is common to have them inspected by tradesmen, both at the beginning and expiration of a lease, for the purpose of determining their condition, and awarding such repairs as may be necessary. In some districts it is the practice to ascertain their value at the commencement of a lease, the tenant being bound at his removal, when a second valuation takes place, to pay or to accept the difference. But the objections to this method are obvious. If no change has taken place during the currency of the lease in the price of materials and wages of labour, the tenant suffers by being called upon to make good the decay occasioned by the lapse of time, which ought to be considered as covered by his rent. If, on the other hand, both materials and labour have advanced in price, as was the case of late years, the proprietor may be obliged to make a large payment to the removing tenant, even though the houses are rendered of less real value, not only by time, but by carelessness or dilapidations.

SECT. III. FENCES.

Fences.

Next to implements and machinery and suitable buildings, fences are in most situations indispensable to the profitable management of arable land. They are not only necessary to protect the crops from the live stock of the farm, but often contribute, in no small degree, by the shelter they afford, to augment and improve the produce itself. On all arable farms on which cattle and sheep are pastured, the ease, security, and comfort, which good fences give, both to the owner and the animals themselves, are too evident to require particular notice. And as there are few tracts so rich as to admit of crops being carried off the land for a succession of years, without the intervention of green crops consumed where they grow, fences of some description or other can very rarely be dispensed with, even in the most fertile and highly improved districts.

There is no branch of husbandry so generally mismanaged as this. No district of any considerable extent, perhaps, can be named, in which one does not see the greater part of what are called fences, not only comparatively useless, but wasteful to the possessor of the lands which they occupy, and injurious both to himself and his neighbours, by the weeds which they shelter. This is particularly the case with thorn hedges, which are too often planted in soils where they can never, by any management, become a sufficient fence; and which, even when planted on suitable soils, are in many cases so much neglected when young, as ever afterwards to be a nuisance, instead of an ornamental, permanent, and impenetrable barrier, which, with proper training, they might have formed in a few years.

General rules.

Until of late, inclosures have too often been made without much regard to the size of the farm, the exposure, the form of the fields, and the equability of the soil. This is the more to be regretted in the case of live fences, which ought to endure for a long course of years, and which cannot be eradicated without considerable expense. It is impossible, indeed, to lay down any rules on this subject that would be generally applicable; but upon a little reflection, it must be evident that the size of the field should be suited not only to the extent of the farm, but also to the nature of the soil, which ought to prescribe the course of management, whether in alternate white or green crops, or with the intervention of several years' pasturage; that the exposure of the land should be considered, in order that the fences may give the shelter that is most required; that the form of the field should be such as to render it most accessible from the farm-buildings, and that it may be cultivated at the least expense, the lands or ridges not being too short, nor running out into angles at the points where the fence takes a different direction; and that the soil of the inclosure should be as nearly alike throughout as possible, that the whole field may be always under the same kind of crop. It must, in general, be a matter of consequence to have water in every inclosure; but this is too obvious to escape attention.

Notwithstanding the garden-like appearance which trees growing in hedges give to the landscape, it seems to be agreed by the most intelligent agriculturists that they are extremely hurtful to the fence, and, for some distance, to the crops on each side; and it is evident that, in many instances, the highways, on the sides of which they often stand, suffer greatly from their shade. It has therefore been doubted whether such trees be profitable to the proprietor, or beneficial to the public;—to the farmer they are almost in every case injurious to a degree beyond what is commonly imagined.

In the subdivisions of an arable farm, whatever may be the kind of fence which it is thought advisable to adopt, we would recommend that particular attention be paid to the course of crops which the quality of the soil points out as the most advantageous; and that, upon all farms not below a medium size, there should be twice the number of inclosures that there are divisions or *breaks* in the course. Thus, if a six years' rotation be thought the most profitable, there should be twelve inclosures, two of which are always under the same crop. One very obvious advantage in this arrangement is, that it tends greatly to equalize labour, and, with a little attention, may contribute much to equalize the produce also. On large farms, where all the land under turnips and clover, for instance, is near the extremity of the grounds, or at a considerable distance from the buildings, supposed to be set down near the centre, it is clear that the labour of supplying the house and straw-yard stock with these crops, as well as the carriage of the manure to the field, is much greater than if the fields were so arranged as that the half of each of these crops had been near the offices. But by means of two fields for each crop in the rotation, it is quite easy to connect together one field near the houses with another at a distance, and thus to have a supply at hand for the home stock, while the distant crops may be consumed on the ground. The same equalization of labour must be preserved in the cultivation of the corn fields and in harvesting the crops. The time lost in travelling to some of the fields, when working by the plough, is of itself a matter of some consequence on large farms. But the advantages of this arrangement are not confined to the equalization and economy of labour; it may also in a great measure render the annual produce uniform and equable, notwithstanding a considerable diversity in the quality of the soil. A field of an inferior soil may be connected with one that is naturally rich; and in the consumption of the green crops, as well as in the allowance of manure, the poor land may be gradually brought nearer, in the quantity and quality of its produce, to the rich, without any injury to the latter. Thus, a field under turnips may be so fertile that it would be destructive to the succeeding corn crop to consume the whole or the greater part on the ground; while another may be naturally so poor, or so deficient in tenacity, as to make it inexpedient to spare any part for consumption elsewhere. By connecting these two under the same crop,—by carrying from the one the turnips that are wanted for the feeding-houses and straw-yards, and eating the whole crop of the other on the ground with sheep, the ensuing crop of corn will not be so luxuriant on the former as to be unproductive, while the latter will seldom fail to yield abundantly. The same plan will also be advantageous in the case of other crops. Hay or green clover may be taken from the richer field, and the poorer one depastured; and on the one wheat may succeed both turnips and clover, while the more gentle crops of barley and oats are appropriated to the less fertile field.

These observations are particularly applicable to turnip soils, of such a quality as not to require more than one year's pasturage, and which are therefore cultivated with corn and green crops alternately; but the same principle may be extended to clay lands, and such as require to be depastured two or more years in succession.

It is scarcely necessary to add, that upon wet soils, where hedges are employed as fences, it is of importance that the ditches be drawn in such a direction as to serve the purposes of drains, and also that they may receive the water from the covered drains that may be required in the fields contiguous. According as the line of the fence is more or less convenient in this respect, the expense of draining may be considerably diminished or increased.

The most common fences, of a permanent character, are *stone walls* and *white thorn hedges*. Stone walls have the recommendation of being an immediate fence, but the disadvantage of going gradually to decay, and of requiring to be entirely rebuilt, in some cases every twenty years, unless they are constructed with lime mortar, which is in many districts much too expensive to be employed in erecting common fences. White thorn hedges, on the contrary, though they require several years to become a fence of themselves, may be preserved at very little expense afterwards in full vigour for several generations.

Having thus thrown out a few hints of a general nature on this important subject, we shall only mention such of the fences as are in common use, and of a permanent character, without attempting to enumerate all the varieties and combinations which may be occasionally found in practice, or such as are only meant to serve a temporary purpose.

Fences in common use.

The two leading divisions, as just mentioned, are into hedges and stone walls; to which are added in particular situations fences of iron, though these last are for the most part confined to gentlemen's parks, and partake as much of ornament as utility.

With regard to hedges, the plant in most common use is the white thorn, though we have seen very good hedges composed of beech, holly, and other plants; and it is not unusual to find a mixture of all these and others in many parts of England. The best hedges, however, are composed exclusively of the white thorn, which, when properly managed, makes the most effectual and durable of all fences. The usual practice is to open a trench or ditch, and with the earth to form a bank, on the face of which thorns are planted almost in a horizontal direction, and with their tops protruding a few inches outwards; the bank being continued above the roots of the thorns to such a height as may be deemed necessary. And as a further protection, while the plants are young, a paling or a dead hedge is carried along the top of the bank, which makes an effectual fence at the very outset. When the thorns have grown up to form a sufficient fence of themselves, the paling or dead hedge is no longer wanted. In some instances whins or furze are sown upon the bank, for the same purpose of protecting the young thorns, and rendering the fence more complete. The dimensions of the ditch and the height of the bank are in a great measure arbitrary, depending upon the nature of the soil, and whether the ditch is or is not required for the purpose of draining the land. A double ditch is sometimes used, with a bank in the middle, and a row of thorns on each side; but in ordinary cases it is a great objection that this fence occupies so much space, besides being more expensive, both in forming and rearing, than the single fence.

Stone walls are constructed of different dimensions, according to the purposes for which they are intended. The most common and generally useful for agricultural purposes are about five feet high, built close, and finished on the top with a coping of turf or long stones. The latter are laid on edge, and project a little over the breadth of the wall, the interstices being filled up and closely packed with small stones. In some parts of Scotland, what is called the *Galloway Dyke* is found to form a very cheap and useful fence on hilly grounds, where the inclosures are large. It is built close or double for about two feet from the ground, and then carried up to the height of four or four and a half feet with stones so placed as to admit of the light passing through the wall; and when any part of it falls down, it is easily repaired. Sheep, it is alleged, are deterred from leaping against such a fence, from its being thus open, more than they would be if it were built solid and of greater height.

A fence which combines in some measure the advantages of both the quick hedge and the stone wall, has been found to answer in situations where the soil is not well adapted to the ditch and hedge alone, and particularly where land stones are abundant, and there is a scarcity of wood for rails or paling. This fence is executed in the following manner: A ditch is formed, with one side of it perpendicular, or nearly so, and a facing of stone is then begun at the bottom and carried up regularly in the manner that stone walls are usually built, the space between the wall and the side of the bank being filled up with the earth taken out of the ditch, which should be of a good quality, and mixed with lime or compost. The thorns are then laid down in such a manner as that four inches or more of the root or stem shall rest upon the earth, the top of the plant projecting beyond the wall. They are then covered with earth, and the wall and the bank behind carried upwards as far as may be thought necessary. In this way the plants appear to grow from the face of the wall which affords them protection, and they are not so liable to be annoyed with weeds as if they had been planted on a bank of earth. But this method seems better adapted to an outside fence than to one for separating fields on either side, unless the wall be carried up by itself considerably above the height of the bank. (*General Report of Scotland*, vol. i.)

We may add, that in many instances there seems to be a radical error in the first construction and subsequent management of hedge-fences in particular, which might be easily removed under appropriate covenants of lease. The expense of inclosing, and of course the direction and construction of the fences, ought to be undertaken in almost every case by the proprietor, not merely for the sake of relieving the tenant from a burden which may be incompatible with his circumstances and professional duties, but also from a principle of economy on the part of the landlord. Whatever may be the tenant's knowledge and capital, it is not to be expected that his views should extend much beyond his own accommodation during his temporary occupation; whereas the permanent interest of the landlord requires, not so much a minute attention to economy in the first instance, as that the amelioration shall be as complete and as durable as possible. The tenant's outlay on fences must inevitably be returned by a diminution of the yearly rent, and probably with a large profit for the first advance of the money; while, at the same time, that money may be expended in an improvement which is neither so complete nor so lasting as it might have been rendered had it been done at the expense and under the direction of the proprietor.

But another error of the same kind is probably still more common, and by far more pernicious to landholders. The fences are to be kept in repair by the tenant; which, in so far as regards stone walls, is a stipulation no way objectionable. But it often happens that a landlord, even though he runs a hedge-fence at his own expense, leaves it to be trained up by the tenant without his interference; and the consequence is, that in perhaps nine cases out of ten, it never becomes a sufficient fence at all; that the original cost is lost for ever; and that the land which it occupies is not only unproductive, but actually a nuisance. Besides, it is evidently improper to require of a tenant to rear up a good fence, commonly by a greater outlay than was required for forming it, when the half of his lease perhaps must elapse before he can derive much benefit from it. This mistake on the part of proprietors is probably the principal cause of the badness of hedge-fences; for if they are neglected when the plants are young,—if cattle are allowed to make gaps,—water permitted to stagnate in the ditch,—or weeds to grow unmolested on the face of the bank, no labour or attention afterwards will ever make an equal and strong fence. As it is well known how difficult or rather impossible it is to enforce this care by any compulsory covenants, the best plan for both parties is that which is adopted in some districts, where hedges are reared at the mutual expense of landlord and tenant,—the thorns, while they require it, being protected by rails, or otherwise, so as to give the tenant all the advantages of a complete fence in the mean time. In this case he cannot justly complain that he pays a share of the expense; and this payment furnishes the strongest motive for preserving the young thorns from damage, and for training them with such care as to become a complete fence in the shortest possible period.

Laws regarding fences.

The provisions of the law of Scotland in regard to inclosing have greatly promoted this invaluable improvement. It holds out the greatest facilities, both for straightening the boundaries of conterminous properties, and for erecting march-fences, by obliging every proprietor, upon due notice from his neighbour, to defray half the charges of such a fence as the nature of the soil and surface may render most eligible. By an act in 1686, cattle must be constantly herded during the day, if the pastures be not inclosed, and are ordered to be kept during the night in houses, folds, or inclosures; a fine is exigible from the owner if his cattle trespass on his neighbour's lands,—so much for every animal,—over and above the damage done, even where there are no fences; and, by the statute 1695, heavy penalties are denounced against such as destroy fences.

Odometer.

As connected with the subject of fences and other rural works, though applicable to many other purposes, we may notice an instrument called the *Odometer*, exhibited a few years ago to the Highland Society of Scotland by Mr Hunter of Thurston, of which figures will be found in Plate IX. By merely walking from one end to the other of any wall, road, hedge, ditch, &c. with this instrument, which is not more troublesome than a walking-stick, the length is found much more correctly than by a measuring chain, and with much greater expedition. Mr Hunter has one so constructed as to measure nearly 1300 miles, which may be attached to the wheel of any carriage, and will measure the road passed along at any rate of travelling.

SECT. IV. TILLAGE.

General observations.

As the operations connected with tillage must necessarily be regulated by the condition of the soil and surface, and the crops to be cultivated, as to which we shall have occasion to treat in a subsequent section, all that is at present necessary is, to offer a few general observations, premising that we here take it for granted, that all those obstructions which fall to be considered under the chapter on Natural Pastures and Wastes, have either never existed, or been already removed.

It is well known to every husbandman, that clayey or tenacious soils should never be ploughed when wet; and that it is almost equally improper to allow them to become too dry, especially if a crop is to be sown without a second ploughing. The state in which such lands should be ploughed is that which is commonly indicated by the phrase, "between the wet and the dry,"—while the ground is slightly moist, mellow, and the least cohesive.

Winter ploughing.

In ploughing the first time for fallow or green crops, all good farmers begin immediately after harvest, or after wheat sowing is finished; and when this land has been gone over, the old tough swards, if there be any, are next turned up. The reasons for ploughing so early are sufficiently obvious; as the frosts of winter render the soil more friable for the spring operations, and assist in destroying the weed-roots. In some places, however, the first ploughing for fallow is still delayed till after the spring seed-time.

In the following remarks, the *swing-plough*, drawn by two horses, is to be understood as the one employed, if no other be mentioned; and we shall here confine ourselves for the most part to the practice of the north of England and the south-east of Scotland.

Three different points require particular attention in ploughing: 1. the breadth of the slice to be cut; 2. its depth; and 3. the degree in which it is to be turned over;—which last circumstance depends both upon the construction of the plough, particularly the mould-board, and the care of the ploughman.

The breadth and depth of the furrow-slice are regulated by judiciously placing the draught on the nozzle or bridle of the plough; setting it so as to go more or less deep, and to take more or less land or breadth of slice, according as may be desired. In general, the plough is so regulated that, if left to itself, and merely kept from falling over, it would cut a little broader and a little deeper than is required. The coulter is also placed with some inclination towards the left or land side, and the point of the sock or share has a slight tendency downwards.

Different modes of ploughing.

The degree to which the furrow-slice turns over, is in a great measure determined by the proportion between its breadth and depth, which for general purposes is usually as three is to two; or when the furrow is nine inches broad, it ought to be six inches in depth. When the slice is cut in this proportion, it will be nearly half turned over, or recline at an angle of 40 or 45 degrees; and a field so ploughed will have its ridges longitudinally ribbed into angular drills or ridgelets. But if the slice is much broader in proportion to its depth, it will be almost completely overturned, or left nearly flat, with its original surface downwards; and each successive slice will be somewhat overlapped by that which was turned over immediately before it. And finally, when the depth materially exceeds the width, each furrow-slice will fall over on its side, leaving all the original surface bare, and only laid somewhat obliquely to the horizon.

The *first* of these modes of ploughing, where the breadth and depth are nearly in the proportion already mentioned, is the best adapted for laying up stubble land after harvest, when it is to remain during winter exposed to the mellowing influence of frost, preparatory to fallow or turnips. The *second* or shallow furrow, of considerable width, as five inches in depth by eight or nine wide, is understood to answer best for breaking up old leys, because it covers up the grass turf, and does not bury the manured soil. The *third* is a most unprofitable and uselessly slow operation, which ought seldom or never to be adopted. The most generally useful breadth of a furrow-slice is from eight to ten inches, and the depth, which ought to be seldom less than four inches, cannot often exceed six or eight inches, except in soils uncommonly thick and fertile. When it is necessary to go deeper, as for carrots and some other deep-rooted plants, a trench-ploughing may be given by means of a second plough following in the same furrow. Shallow ploughing ought always to be adopted after turnips are eaten on the ground, that the manure may not be buried too deep; and also in covering lime,—especially if the ground has been pulverized by fallowing, because it naturally tends to sink in the soil. In ploughing down farm-yard dung, it is commonly necessary to go rather deep, that no part of the manure may be left exposed to the atmosphere. In the first ploughing for fallow or green crops, it is advisable to work as deep as possible; and no great danger is to be apprehended, though a small portion of the subsoil be at that time brought to the surface.

Lands or ridges.

The furrow-slices are generally distributed into beds, varying in breadth according to circumstances; these are called *ridges* or *lands*, and are divided from one another by gutters or open furrows. These last serve as guides to the hand and eye of the sower, to the reapers, and also for the application of manures in a regular manner. In soils of a strong or retentive nature, or which have wet, close subsoils, these furrows serve likewise as drains for carrying off the surface water; and being cleared out after the land is sown and harrowed, have the name of *water-furrows*.

Ridges are not only different in breadth, but are raised more or less in the middle on different soils. On clayey, retentive soils, the great point to be attended to is the discharge of superfluous water. But narrow stitches of from three to five feet are not approved of in some of the best cultivated counties. In these a breadth of fifteen or eighteen feet, the land raised by two *gatherings* of the plough, is most commonly adopted for such soils; such a ridge being thought more convenient for manuring, sowing, harrowing, and reaping, than a narrower one; and the water is drained off quite as effectually.

On dry, porous turnip soils, ridges may be formed much broader; and were it not for their use in directing the labourers, may be, and sometimes are, dispensed with altogether. They are often thirty or thirty-six feet broad, which in Scotland are called *band-win* ridges, because reaped by a band of shearers, commonly six, served by one binder. If it be wished to obliterate the intermediate furrows, this may be done by casting up a narrow ridgelet or single-bout drill between the broad ridges, which is afterwards levelled by the harrows.

With regard to the mode of forming these ridges straight and of uniform breadth, let us suppose a field perfectly level that is intended to be laid off into ridges of any determinate breadth. The best ploughman belonging to the farm conducts the operation, with the aid of three or more poles shod with iron, in the following manner: the first thing is to mark off the head ridges, on which the horses turn in ploughing, which should in general be of an equal breadth from the bounding lines of the field, if these lines are not very crooked or irregular. The next operation, assuming one straight side of the field, or a line that has been made straight, as the proper direction of the ridges, is to measure off from it with one of the poles (all of them of a certain length, or expressing specific measures) half the intended breadth of the ridge if it is to be gathered, or one breadth and a half if to be ploughed flat; and there the ploughman sets up a pole as a direction for the plough to enter. On a line with this, and at some distance, he plants a second pole, and then in the same manner a third, fourth, &c. as the irregularity of the surface may render necessary, though three must always be employed,—the last of them at the end of the intended ridge, and the whole in one straight line. He then enters the plough at the first pole, keeping the line of poles exactly between his horses, and ploughs down all the poles successively; halting his horses at each, and replacing it at as many feet distant as the ridges are to be broad; so that when he reaches the end of the ridge, all his poles are again set up in a new line parallel to the first. He returns, however, along his former track, correcting any deviations, and throwing a shallow furrow on the side opposite to his former one. These furrows, when reversed, form the crown of the ridge, and direct the ploughmen who are to follow. The same operations are carried on until the whole field is marked out. This is called *feiring* in Scotland, and *striking the furrows* in England. It is surprising with what accuracy these lines are drawn by skilful ploughmen.

Another method has been adopted for the same purpose, which promises to be useful with less experienced workmen. A stout lath or pole, exactly equal in length to the breadth of the intended ridge, is fixed to the plough at right angles to the line of the draught, one end of which is placed across the handles exactly opposite the coulter, while the other end projects towards the left hand of the ploughman, and is preserved in its place by a rope passing from it to the collar of the near side horse. At the outer end of the lath, a coulter or harrow tine is fixed perpendicularly, which makes a trace or mark on the ground, as the plough moves onwards, exactly parallel to the line of draught. By this device, when the plough is *feiring* the crown of one ridge, the marker traces the line on which the next ridge is to be *feired*. (*General Report of Scotland*, vol. i. p. 354.)

With regard to the direction and the length of ridges, these points must evidently be regulated by the nature of the surface and the size of the field. Short angular ridges, called *butts*, which are often necessary in a field with irregular boundaries, are always attended with a considerable loss of time, and ought to be avoided as much as possible.

In ploughing steep land it is advisable to give the ridges an inclination towards the right hand at the top, by which in going up the acclivity the furrow falls more readily from the plough, and with less fatigue to the horses. Another advantage of forming ridges in a slanting direction on such land is, that the soil is not so apt to be washed down from the higher ground, as if the ridges were laid at right angles. Wherever circumstances will permit, however, the best direction is due north and south, by which the grain on both sides of the ridge derives nearly equal advantages from the influence of the sun.

Crown and furrow ploughing.

Casting.

Gathering.

Cleaving.

The land being thus formed into ridges, is afterwards cultivated without marking out the ridges anew, until the inter-furrows have been obliterated by a fallow or fallow crop. This is done by one or other of the following modes of ploughing:—1. If the soil be dry and the land has been ploughed flat, the ridges are split out in such a way, that the space which the crown of the old ridge occupied is now allotted to the open furrow between the new ones. This is technically called *crown-and-furrow* ploughing. 2. When the soil is naturally rather wet, or if the ridges have been raised a little by former ploughings, the form of the old ridges, and the situation of the inter-furrows, are preserved by what is called *casting*; that is, the furrows of each ridge are all laid in one direction, while those of the next adjoining ridge are turned the contrary way; two ridges being always ploughed together. 3. It is commonly necessary to raise the ridges on soils very tenacious of moisture, by what is called *gathering*, which is done by the plough going round the ridge, beginning at the crown and raising all the furrow-slices inwards. 4. This last operation, when it is wished to give the land a level surface, as in fallowing, is reversed by turning all the furrow-slices outwards, beginning at the inter-furrows, and leaving an open furrow on the crown of each ridge. In order to bring the land into as level a state as possible, the same mode of ploughing, or *cleaving*, as it is called, may be repeated as often as necessary.

Levelling.

High crooked ridges are universally disapproved of, and are now very rare in the best cultivated districts. A machine employed in levelling such land is exhibited in Plate X.; and a reward was given by the Society of Arts in London for the improvements made on it by Mr David Charles in 1803.

Extent ploughed by two horses.

On strong lands, a pair of good horses ought to plough three quarters of an acre in nine hours; but upon the same land, after the first ploughing, or on friable soils, one acre or an acre and a quarter is a common day's work. Throughout the year an acre a day may be considered as a full average on soils of a medium consistency. The whole series of furrows on an English statute acre, supposing each to be nine inches broad, would extend to 19,360 yards; and adding twelve yards to every 220 for the ground travelled over in turning, the whole work of one acre may be estimated as extending to 20,416 yards, or eleven miles and nearly five furlongs.

Ribbing.

A kind of ploughing known by the name of *ribbing* was formerly common on land intended for barley, and was executed soon after harvest, as a preparation for the spring ploughings. A similar operation is still in use in some places, after land has been pulverized by clean ploughings, and is ready for receiving the seed. By this method only half the land is stirred, the furrow being laid over quite flat, and covering an equal space of the level surface. But except in the latter instance, where corn is meant to grow in parallel lines, and where it is used as a substitute for a drill-machine, ribbing is highly objectionable, and has become almost obsolete.

SECT. V. FALLOWING.

Opinions of fallowing.

There is no branch of agricultural practice that has engaged more attention of late than this; and after many years' controversy, in which some of the ablest cultivators of the present day have entered the lists, and exhausted perhaps all the legitimate arguments on both sides, the practice does not appear to give way, but rather to extend, on wet, tenacious clays; and it is only on such that any one contends for the advantages of fallowing. The expediency or inexpediency of pulverizing and cleaning the soil by a bare fallow, is a question that can be determined only by experience, and not by argument. No reasons, however ingenious, for the omission of this practice, can bring conviction to the mind of a farmer who, in spite of all his exertions, finds, at the end of six or eight years, that his land is full of weeds, sour, and comparatively unproductive. Drilled and horse-hoed green crops, though cultivated with advantage on almost every soil, are probably in general unprofitable as a *substitute* for fallow, and after a time altogether inefficient. It is not because turnips, cabbages, &c. will not grow in such soils, that a fallow is resorted to, but because, taking a course of years, the value of the successive crops is found to be so much greater, even though an unproductive year is interposed, as to induce a preference to fallowing. Horse-hoed crops of beans, in particular, postpone the recurrence of fallow, but in few situations can they ever exclude it altogether.

On the other hand, the instances that have been adduced of a profitable succession of crops on soils of this description, without the intervention of a fallow, are so well authenticated, that it would be extremely rash to assert that it can in no case be dispensed with on clay soils. Instances of this kind are to be found in different parts of Mr Young's *Annals of Agriculture*; and a very notable one, on Mr Greg's farm of Coles, in Hertfordshire, is accurately detailed in the sixth volume of the *Communications to the Board of Agriculture*.

The principal causes of this extraordinary difference among men of great experience may probably be found in the quality of the soil, or in the nature of the climate, or in both. Nothing is more vague than the names by which soils are known in different districts. Mr Greg's farm in particular, though the soil is denominated "heavy arable land," and "very heavy land," is found so suitable to turnips, that a sixth part of it is always under that crop, and these are consumed on the ground by sheep—a system of management which every farmer must know to be altogether impracticable on the wet, tenacious clays of other districts. It may indeed be laid down as a criterion for determining the question, that wherever this management can be profitably adopted, fallow, as a regular branch of the course, must be not less absurd than it is injurious both to the cultivator and to the public. It is probable, therefore, that in debating this point, the opposite parties are not agreed about the quality of the soil, and in particular about its property of absorbing and retaining moisture, so different in soils that in common language have the same denomination.

Another cause of difference must be found in the climate. It is well known that a great deal more rain falls on the west than on the east coast of Britain, and that between the southern and northern counties there is at least a month or six weeks' difference in the maturation of the crops. Though the soil therefore be as nearly as possible similar in quality and surface, the period in which it is accessible to agricultural operations must vary accordingly. Thus, in the south-eastern counties of the island, where the crops may be all cut down, and almost all carried home by the end of August, much may be done in cleansing and pulverizing the soil during the months of September and October, while the farmers of the north are exclusively employed in harvest work, which is frequently not finished by the beginning of November. In some districts in the south of England wheat is rarely sown before December; whereas in the north, and still more in Scotland, if it cannot be got completed by the end of October, it must commonly be delayed till spring, or oats or barley be taken in place of wheat.

It does not then seem of any utility to enter farther into this controversy, which every skilful cultivator must determine for himself. All the crops, and all the modes of management which have been proposed as a substitute for fallow, are well known to such men, and would unquestionably have been generally adopted long ago, if, upon a careful consideration of the advantages and disadvantages on both sides, a bare fallow was found to be unprofitable in a course of years. The reader who wishes to examine the question fully may consult, among many others, the works noted below.[1]

However necessary the periodical recurrence of fallow may be on retentive clays, its warmest advocates do not recommend it on turnip soils, or on any friable loams incumbent on a porous subsoil; nor is it in any case necessary every third year, according to the practice of some districts. On the best cultivated lands it seldom returns oftener than once in six or eight years, and in favourable situations for obtaining an extra-supply of manure, it may be advantageously dispensed with for a still longer period.

Fallows are in many instances so grossly mismanaged, particularly where they recur so often as to make it an object to derive some profit from them by means of sheep, that it may be of use to describe the several operations, according to the justly esteemed practice of East Lothian and Berwickshire.

Fallowing described.

"Invariably after harvest, the land intended for being summer-fallowed in the ensuing year gets an end-long ploughing, which ought to be as deep as the soil will admit, even though a little of the *till* or subsoil is brought up. This both tends to deepen the cultivated or manured soil, as the fresh accession of hitherto uncultivated earth becomes afterward incorporated with the former manured soil, and greatly facilitates the separation of the roots of weeds during the ensuing fallow process, by detaching them completely from any connection with the fast subsoil. This autumnal ploughing, usually called the winter furrow, promotes the rotting of stubble and weeds; and if not accomplished towards the end of harvest, must be given in the winter months, or as early in the spring as possible. In giving this first ploughing, the old ridges should be gathered up, if practicable, as in that state they are kept dry during the winter months; but it is not uncommon to split them out or divide them, especially if the land had been previously highly gathered, so that each original ridge of land is divided into two half-ridges. Sometimes, when the land is easily laid dry, the furrows of the old ridges are made the crowns of the new ones, or the land is ploughed in the way technically called *crown-and-fur*. In other instances, two ridges are ploughed together by what is called *casting*, which has been already described. After the field is ploughed, all the inter-furrows, and those of the headlands, are carefully opened up by the plough, and are afterwards gone over effectually by a labourer with a spade, to remove all obstructions, and to open up the water furrows into the fence ditches, wherever that seems necessary, that all moisture may have a ready exit. In every place where water is expected to lodge, such as *dishes* or hollow places in the field, cross or oblique furrows are drawn by the plough, and their intersections carefully opened into each other by the spade. Wherever it appears necessary, cross cuts are also made through the head ridges into the ditches with a spade, and every possible attention is exerted that no water may stagnate in any part of the field.

"As soon as the spring seed-time is over, the fallow land is again ploughed end-long. If formerly split, it is now ridged up; if formerly laid up in gathered ridges, it is split or cloven down. It is then cross-ploughed; and after lying till sufficiently dry to admit the harrows, it is harrowed and rolled repeatedly, and every particle of the vivacious roots of weeds brought up to view, carefully gathered by hand into heaps, and either burnt on the field or carted off to the compost midden. The fallow is then ridged up, which places it in a safe condition in the event of bad weather, and exposes a new surface to the harrows and roller; after which the weeds are again gathered by hand, but a previous harrowing is necessary. It is afterwards ploughed, harrowed, rolled, and gathered as often as may be necessary to reduce it into fine tilth, and completely to eradicate all root-weeds. Between these successive operations, repeated crops of seedling weeds are brought into vegetation and destroyed. The larvæ likewise of various insects, together with an infinite variety of the seeds of weeds, are exposed to be devoured by birds, which are then the farmer's best friends, though often proscribed as his bitterest enemies.

"Some writers on husbandry have condemned the use of the harrow and roller in the fallow process, alleging that frequent ploughing is all that is necessary to destroy root-weeds, by the baking or drying of the clods in the sun and wind; but experience has ascertained, that frequently turning over the ground, though absolutely necessary while the fallow process is going on, can never eradicate couchgrass or other root-weeds. In all clay soils the ground turns up in lumps or clods, which the severest drought will not penetrate so sufficiently as to kill the included roots. When the land is again ploughed, these lumps are simply turned over and no more, and the action of the plough serves in no degree to reduce them, or at least very imperceptibly. It may be added, that these lumps likewise inclose innumerable seeds of weeds, which cannot vegetate unless brought under the influence of the sun and air near the surface. The diligent use, therefore, of the harrow and roller, followed by careful hand-picking, is indispensably necessary to the perfection of the fallow process." (*General Report of Scotland*, vol. i. p. 419.)

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[1] Young's *Annals of Agriculture*, and his writings generally; Hunter's *Georgical Essays*; Dickson's *Practical Agriculture*; Sir H. Davy's *Agricultural Chemistry*; Brown's *Treatise on Rural Affairs*; *The County Reports*; and *The General Report of Scotland*.

When effectually reduced to fine tilth, and thoroughly cleansed from roots and weeds, the fallow is ploughed end-long into gathered ridges or lands, usually 15 or 18 feet broad, which are set out in the manner already described in treating of the striking of furrows, or *feiring*. If the seed is to be drilled, the ridges are made of such widths as may suit the construction of the particular drill-machine that is to be employed. After the land has been once gathered by a deep furrow, proportioned to the depth of the cultivated soil, the manure is laid on, and evenly spread over the surface, whether muck, lime, marl, or compost. A second gathering is now given by the plough; and this being generally the furrow upon which the seed is sown, great care is used to plough as equally as possible. After the seed is sown and the land thoroughly harrowed, all the inter-furrows, furrows of the headlands, and oblique or *gaw* furrows, are carefully opened up with the plough, and cleared out with the spade, as already mentioned respecting the first or winter ploughing.

The expense of fallowing must appear, from what has been said, to be very considerable, when land has been allowed to become stocked with weeds; but if it be kept under regular management, corn alternating with drilled pulse or green crops, the subsequent returns of fallow will not require nearly so much labour. In common cases, from four to six ploughings are generally given, with harrowing and rolling between, as may be found necessary; and, as we have already noticed, the *cultivator* may be employed to diminish this heavy expense. But it must be considered, that upon the manner in which the fallow operations are conducted depends not only the ensuing wheat crop, but in a great measure all the crops of the rotation.

SECT. VI. OF THE DIFFERENT KINDS OF CROPS.

Popular division of crops.

The crops cultivated in Britain present every variety of which the soil and climate will admit; and in an agricultural point of view may be considered under several divisions, according to their nature, or the purposes for which they are intended. The most popular arrangement places all sorts of farm crops under the two general heads of corn and green crops; the former applicable to the use of man, and the latter to that of cattle, sheep, and other varieties of live stock. The former include the different *cerealia*, of which the most important are wheat, barley, rye, and oats. The latter, or green crops, comprise a still greater variety, the words being, in common language, applied not only to pulse or leguminous plants, such as peas, beans, tares, &c. but also to the different varieties of herbage, as well as to turnips, potatoes, and other roots. A leading distinction between these two divisions is, that corn or other culmiferous plants ripening their seeds are held to be scourging crops, whereas those that fall under the denomination of green crops are considered to be of an ameliorating description, or at least as not impairing the productive powers of the soil in the same degree. As it is our object to treat only of matters of practical utility, we shall not attempt any scientific arrangement, but content ourselves with describing the principal crops, with their mode of culture, produce, and application, in popular language, confining our remarks at present chiefly to such as are cultivated from year to year, as distinguished from those which, like the pasture grasses, are intended to occupy the soil permanently or for an indefinite period. Of these by far the most important is,

1. *Wheat.*

Wheat.

The soil best adapted to this grain is a clay or strong loam, though its growth is by no means confined to such soils. Before the introduction of turnips and clover, all soils but little cohesive were thought quite unfit for wheat; but, even on sandy soils, it is now grown extensively and with much advantage after either of these crops. The greater part of the wheat crop throughout Britain, however, is probably still sown upon fallowed land. When it succeeds turnips consumed on the ground, or clover cut for hay or soiling, it is commonly sown after one ploughing; but, upon heavier soils, or after grass of two or more years, the land is ploughed twice or three times, or receives what is called a *rag-fallow*.

Varieties.

The varieties of this grain are so numerous as not to admit of being enumerated here; but the most general classification is according to colour, all the varieties being divided into white and red, though with several shades between; or according to the time which the grain requires to remain in the ground, being either sown before winter, or in the spring months; and hence the distinction between winter and spring or summer wheat. But this last variety must not be confounded with the winter wheats, which are sometimes sown in spring. Several other differences in wheat are sufficiently obvious: thus, the true summer wheat is usually bearded, and some of the winter varieties are distinguished by being woolly-eared, or by the thickness of the chaff; all which and other peculiarities give rise to different names, which are sufficiently understood in particular districts, though not in general use.

The fine white wheats are considered more delicate than the red; but the latter, though seldom sown on rich warm soils, are found most profitable, from their hardiness and early ripening, on inferior land, in an unfavourable climate. A great many different sorts of summer wheat, transmitted some years ago to the president of the Board of Agriculture by the Agricultural Society of Paris, were divided, for the purpose of experiment, among several distinguished agriculturists (*Communications to the Board of Agriculture*, vol. vii. page 11); but their comparative merits, or adaptation to the climate of Britain, do not seem to have been satisfactorily ascertained. Summer, or, as it is often called, spring wheat, has, however, been long and extensively cultivated in some parts of England, particularly in Lincolnshire, and may probably be found a valuable crop in the southern counties; but the trials that have been made of it in the north do not entitle it to a preference over winter wheat sown in spring, or even to oats or barley, in that climate. It is sometimes usefully employed in filling up any blanks that appear in spring among the winter-sown wheats.

Winter wheat is sown on early turnip soils, after clover or turnips, at almost every period from the beginning of September till the middle of March; but the far greater part is sown in September and October. For *summer* wheat, in the southern districts, May is sufficiently early; but in the north, the last fortnight of April is thought a more eligible seed-time. In the cultivation of spring-sown winter wheat, it is of importance to use the produce of spring-sown grain as seed, as the crop of such grain ripens about a fortnight earlier than when the produce of the same wheat winter-sown is employed as spring seed.

Preparation of seed.

Wheat, before being sown, is usually prepared with *pickles* or steeps and quicklime, as a preventive of *smut*. We shall only add a short account of a method of preparation which has been followed with success in the south of Scotland, and of the efficacy of which we can speak from our own experience. Take four vessels, two of them smaller than the other two, the former with wire bottoms, and of a size to contain about a bushel, the latter large enough to hold the smaller within them. Fill one of the large tubs with water, and, putting the wheat in a small one, immerse it in the water, and stir and skim off the grains that float above; and renew the water as often as is necessary, till it comes off almost quite clean. Then raise the small vessel in which the wheat is contained, and repeat the process with it in the other large tub, which is to be filled with stale urine; and in the mean time wash more wheat in the water tub. When abundance of water is at hand, this operation is by no means tedious; and the wheat is much more effectually cleansed from all impurities, and freed more completely from weak and unhealthy grains and the seeds of weeds, than can be done by the winnowing-machine. When thoroughly washed and skimmed, let it drain a little, then empty it on a clean floor, or in the cart that is to take it to the field, and riddle quicklime upon it, turning it over, and mixing it with a shovel, till it be sufficiently dry for sowing.

Broad-cast and drill sowing.

Wheat is most commonly sown *broad-cast*, in a manner too well known to need any description. Drilling is, however, extensively practised in some districts, and is becoming more general on lands infested with the seeds of annual weeds, especially when sown in spring. A machine which sows at three different intervals, according to the judgment of the farmer, of 12, 10½, or 9 inches, is much approved of in Scotland. It deposits six, seven, or eight rows at once, according as it is adjusted to one or other of these intervals, and the work is done with ease and accuracy when the ridges are previously laid out of such a breadth, 12½ feet, as to be sown by one *bout*; the machine going along one side of such a ridge, and returning on the other, and its direction being guided by one of its wheels, which thus always runs in the open furrow between the ridges. If the 10½ inch interval be adopted, and it is the most common one in that country, the machine sows seven rows at once, or 14 rows on a ridge of 12½ feet. But the space between the rows varies in some parts still more than this machine admits of; it ought not, however, to be so narrow as to prevent hand-hoeing, even after the crop has made considerable progress in growth; and it cannot advantageously be so wide as to admit the use of any effective horse-hoe.

Sowing on ribbs.

A third mode of sowing is common in some places, by which a drill-machine is dispensed with, though the same purpose is nearly answered. This is by what is called *ribbing*, which we have already adverted to in the section on tillage. The seed is scattered with the hand in the usual broad-cast manner, but as it necessarily falls for the most part in the furrows between the ribbs, the crop rises in straight parallel rows, as if it had been sown by a drill-machine; and the ribbs are afterwards levelled by harrowing across them. This plan has nearly all the advantages of drilling, in so far as regards exposure to the rays of the sun, and the circulation of air among the plants; but, as some plants must always rise between the rows, it is not quite so proper when hand-hoeing is required.

Dibbling.

The dibbling of wheat is practised to some extent in the county of Norfolk, and occasionally in other quarters, though it is perhaps too laborious and tedious a process in our unsteady climate ever to come into general use. An expert dibbler, with the assistance of three children to drop the grains, goes over about half an acre a day; and the seed, which is usually from one bushel to six pecks per acre, is covered by means of a bush-harrow. The principal, if not the only advantage that attends this method, is the saving of seed. An attempt was made to employ a machine for the purpose, but it has never come into use. We have seen a field of which a part was sown broad-cast and a part dibbled, for the purpose of comparison; and the latter certainly appeared at the time more equal and luxuriant than the former, but it had no superiority in point of produce, except perhaps that it contained a less proportion of small grains, or presented altogether a more equal sample.

Quantity of seed.

The quantity of seed necessary depends both on the time of sowing and the state of the land; land sown early requiring less than the same land when sown in winter or spring, and poor land being at all times allowed more seed than the rich. The quantity accordingly varies from two bushels or less to three, and sometimes even to four bushels per imperial acre. Winter wheat, when sown in spring, ought always to have a liberal allowance, as the plants have not time to tiller much without unduly retarding their maturation.

After-culture.

When wheat is sown broad-cast, the subsequent culture must generally be confined to harrowing, rolling, and hand-hoeing. As grass-seeds are frequently sown in spring on winter-sown wheat, the harrows and roller are employed to loosen the soil and cover the seeds. But these operations, to a certain extent, and at the proper season, are found beneficial to the wheat crop itself, especially on strong clays, and are sometimes performed even when grass-seeds are not to be sown. One or two courses of harrowing penetrate the crust which is formed on tenacious soils, and operate like hand-hoeing in raising a fresh mould to the stems of the young plants. Rolling in spring ought never to be omitted on dry, porous soils, which are frequently left in so loose a state by the winter frosts, that the roots quit the soil and perish; and if the land be rough and cloddy, the roller has a still more beneficial effect than the harrows in pulverizing the inert masses, and extending the pasture of the plants. Hand-weeding, so far as to cut down thistles and other long weeds, is never neglected by careful farmers; but the previous culture ought to leave as little as possible of this work to be done when the crop is growing. Annual weeds, which are the most troublesome, can only be effectually destroyed by hand-hoeing; and to admit of this, the crop should be made to rise in rows, by being sown either by a drill-machine, or on ribbs. Where grass-seeds are to be sown on drilled wheat, the hand-hoeing assists in covering them.

Reaping.

Wheat, which is almost universally reaped with the sickle, ought not to stand till it be what is called *dead* ripe, when the loss is considerable, both upon the field and in the stack-yard. When cut, it is usually tied up in sheaves, which it is better to make so small as to be done by bands the length of the straw, than so thick as to require two lengths to be joined for bands. The sheaves are set up in *shocks* or *stooks*, each containing in all twelve, or, if the straw be long, fourteen sheaves. **Shocks.** In the latter case, two rows of six sheaves are made to stand in such a manner as to be in contact at the top, though, in order to admit the circulation of air, at some distance below; and along this line two sheaves more are placed as a covering, the corn end of both being towards the extremities of the line. **Housing and stacking.** In a few days of good weather the crop is ready for the barn or stack-yard. In the stack-yard, which is commonly contiguous to the farm-offices, having the barn on one of its sides, it is built either in oblong or circular stacks, sometimes on frames supported with pillars, to prevent the access of vermin, and to secure the bottom from dampness; and as soon afterwards as possible the stacks are neatly thatched. When the harvest weather is so wet as to render it difficult to prevent the stacks from heating, it has been the practice to make funnels through them, a large one in a central and perpendicular direction, and small lateral ones to communicate with it. A particular method of constructing pillars, frames, and *bosses*, as the funnels are called, is described in a recent publication. (*Husbandry of Scotland*, vol. i. p. 373.) In the best cultivated counties, the use of large barns for holding the crop is disapproved of, not only on account of the expense, but because corn keeps better, or is less exposed to damage of any kind, in a well-built stack.

Threshing. By means of the threshing-mill all sorts of corn are expeditiously separated from the straw and dressed for market. One man feeds the grain in the straw into the machine, and is assisted by two half-grown lads, or young women, one of whom pitches or carries the sheaves from the bay close to the threshing-stage, while the other opens the bands of every sheaf, and lays the sheaves successively on a small table close by the feeder, who spreads them evenly on the feeding-stage, that they may be drawn in successively by the fluted rollers, to undergo the operation of threshing. In the opposite end of the barn or straw-house into which the rakes or shakers deliver the clean threshed straw, one man forks up the straw from the floor to the *straw-mow*, and two lads, or young women, build it and tread it down. In a threshing-machine worked by water or wind this is the whole expense of hand labour in the threshing part of the operation; and as a powerful machine can easily thresh from two to three hundred bushels of grain in a working day of nine hours, the expense is exceedingly small indeed. Assuming 250 bushels as an average for the work of these people for one day, and their wages to be nine shillings, the expense does not amount to one halfpenny for each bushel of grain. Even reducing the quantity of grain threshed to 150 bushels, the easy work of a good machine of inferior size and power, the expense does not exceed three farthings the bushel. But the whole of this must not be charged against the threshing only, the grain being half-dressed at the same time, by passing through one winnowing-machine, which is always attached to a complete threshing-mill; and where a second can be conveniently connected with it, as is commonly the case if the mill be of considerable power, the corn comes down nearly ready for market: so that the threshing, dressing, and building of the straw, with the use of a powerful water-mill, will scarcely cost more than dressing alone when the flail is employed, after every reasonable allowance for the interest of money, and the tear and wear of the machine.

When grain is threshed with a machine worked by horses, the expense is necessarily and considerably enhanced. One capable of effecting the larger quantity of work already calculated on will require eight good horses, and a man to drive them, who may perhaps require the aid of a boy. The value of the work of eight horses for a day may be stated at 30 shillings, and the wages of the driver may be called two shillings and sixpence. Hence the total expense of threshing 250 bushels may amount to about twopence per bushel, when the wages of the attendants are added; still leaving a considerable difference in favour of threshing by the machine in preference to the flail. Were it even ascertained that the expense of threshing by horses and by the flail is nearly the same, horse-mills are to be recommended on other accounts; such as better threshing, expedition, little risk of pilfering, &c.

Produce. The produce of this crop, like that of most others, necessarily depends mainly upon the nature of the soil and season. In a rich clayey loam it has been known to yield so much as eight quarters the imperial acre, weighing when dressed about 60 lbs. the bushel; but the common return has been estimated at less than half this quantity, and the average cannot perhaps be safely stated higher throughout any one county than from 3 to 3½ quarters, the weight varying from 54 to 62 or 64 lbs. per bushel. The weight of the straw, which may run from a ton to a ton and half per acre, is used for thatch, packing, and, in the country, chiefly for litter to the live stock.

The season best adapted for wheat is universally understood to be a summer in which there is much sunshine and little rain. Both in regard to quantity and quality, the crop is always best in a season rather too dry and hot for some other crops, the produce being then usually much greater than the bulk of the straw would lead one to expect.

Diseases. Wheat is liable to a variety of diseases, particularly in the more advanced stages of its growth. Of these the most destructive are *smut* and *mildew*. **Smut.** The former appears in the shape of a black or smut ball (*lycoperdon globosum*), which partially occupies the ear of the stalk, to the exclusion of the grain, and so far lessens the quantity of produce. But its worst effect is, that when the ball crumbles into powder in the threshing and dressing, this powder contaminates more or less all the sound grain, and thus greatly injures the quality of the whole, whether it be converted into flour or used as seed. If it prevails to a great extent, the wheat is rendered quite unfit for being sown, and ought never to be used in that way, to whatever process it may be previously subjected. We have already noticed a useful method of preparing the seed, which answers the double purpose of clearing the grain from any slight taint of smut, and of separating light grains as well as noxious seeds, but we are aware that the same effect may be obtained by various other means. The object in all cases is to destroy the infection to which the grain is liable from the powder of the smut ball, as it is a general opinion among all intelligent agriculturists, that smut in the seed will produce a smutted crop if sown without preparation. But the safest course is to select such grain for seed as exhibits no appearance of smut at all.

Mildew. *Mildew* is a disease of a very different nature from smut, and its ravages in the most aggravated cases are far more destructive. It is generally thought to be produced by a peculiar state of the atmosphere; and when it comes on between the periods of flowering and ripening, it has been known to destroy whole fields within a few days. In such cases nothing can be done either by way of prevention or remedy. It has been found, however, that in all seasons mildew prevails more or less in particular situations; and there is reason to believe that the vicinity of the barberry bush, and probably several other shrubs, contributes to produce it, the same parasitical fungi being found on the straw of mildewed wheat which are known to abound on the barberry and some other plants. The prevalence of heavy fogs or mist, drizzling rains, and sudden changes in the temperature, have been assigned as the causes of mildew; and as it has been found that open airy exposures are much less affected than low sheltered lands, in years when mildew prevails most generally, the disorder may perhaps be somewhat diminished by drilling, which admits a freer circulation of air. Spring or summer wheat is less liable to mildew than the winter species, though it does not always escape. (Sir Joseph Banks *on Mildew*, and *Communications to the Board of Agriculture*, vol. vii.)

2. *Rye.*

Rye. The cultivation of this species of grain is more limited than it was in former times, when rye, either by itself or mixed with wheat, furnished the bread of the labouring classes; and in most parts of Britain there is no steady demand for it. It is nevertheless a profitable crop in particular districts, and especially on sandy soils, that will scarcely carry any other kind of grain. There are two general varieties, the one sown before winter, and the other in spring; and it is further distinguished by its black or white colour. The winter sort, which is the most plump and hardy grain, is sometimes cultivated as a green crop, to be eaten in spring, where turnips are not raised, or after they are consumed. There is nothing in its habits or mode of culture that requires particular notice. It is sometimes sown on the margins of fields, near farmhouses, as a protection to other crops against the depredations of poultry, which do not feed on it, and seldom penetrate through it; and its straw is more valuable for thatch, though useless as fodder, than that of any other species of corn.

3. *Barley.*

Barley. This is a much less hardy grain than either of the former, and succeeds best on a finely pulverized soil, not so little cohesive as that which will carry rye, but much farther removed, on the other hand, from the clays best adapted to the growth of wheat. It is cultivated largely as a rotation crop in most parts of Britain, and generally sown after turnips, though sometimes after beans or peas; and even after a bare fallow, if the land be not thought fit for wheat, or if the weather has prevented it from being sown at the proper season. Spring-sown wheat, either of the winter or summer species, and early oats, particularly the potato variety, now occupy a portion of the land that was formerly allotted to barley.

Varieties. The most intelligible distinction among the different kinds of barley is founded on the number of the rows on the ear. Thus we have *Hordeum distichon*, two-rowed barley, which is the kind most extensively cultivated, and comprises several varieties; *Hordeum tetrastichon*, four-rowed barley, often called *bear* or *bigg*, the culture of which is, for the most part, confined to inferior soils, or to situations where the climate is unfavourable to the former species; and *Hordeum hexastichon*, or six-rowed barley, which is but little known in Britain, though it is the prevailing kind in the north of Europe, and said to be the hardiest of all.

Preparation. To whatever crop barley succeeds, the harrow and roller, when the plough alone is insufficient, should be employed in reducing the soil to a considerable degree of fineness. In most cases more than one earth is given; though, after a winter furrow, the *cultivator* may be used in spring instead of the plough. After turnips, eaten on the ground by sheep, the land, being consolidated by their treading, sometimes receives two ploughings; but if only one, it should be well harrowed and rolled; and it is often finished by harrowing after the roller, especially if grass-seeds be sown, which are covered by this last harrowing. Barley is sometimes sown on the first ploughing, and covered by a second shallow ploughing. As it is found of great importance, with a view to speedy and equal vegetation, that the ground should be fresh and moist, barley is generally sown upon what is termed *hot-fur*; that is, as soon as possible after it is turned up by the plough.

Season of sowing. From the beginning of April to the middle of May is considered the best season for sowing barley, though in early situations it may be sown a fortnight later. *Bear*, or *bigg*, is an earlier, as well as a hardier kind, than the two-rowed barley, and may be sown later. Winter-sown barley, which may be eaten in spring and afterwards stand for a crop, is found to answer well in particular districts. On land infested with annual weeds, the drilling of this grain is an advantageous practice; but throughout the country at large, this, and all other culmiferous crops, are more generally sown *broad-cast*. If the land be rich, a small quantity of seed is sufficient; often so little as two bushels per acre, and seldom more than three or three and a half; and its produce varies from three to five quarters the acre, and may average four quarters. **Consumption.** The chief consumption is in the distilleries and breweries; but in the north of England, and in Scotland, it is partially used for bread, either by itself, or mixed up with a small proportion of beans or peas, though much less so now than formerly. Part of it is made into what are called pot barley and pearl barley, in which the husk is taken off at the mill; and, in the latter case, so much of the kernel as to give it a round form. It is also occasionally ground into flour by taking out the bran, and in this state made into cakes, which are much esteemed in some parts of Scotland.

Barley, like wheat, is most productive in a dry, warm season. For this reason, what is grown in the south of England is almost always superior to the produce of the northern parts of the island. It is not, like wheat, liable to any peculiar disease; and is, of all the corn-crops, the best nurse for clover, which, under good management, is usually sown along with it. The straw of this grain, which may weigh upon an average about a ton per acre, is used chiefly as litter for live stock.

Reaping. Barley is cut down in some places with the sickle, and in others with the scythe; in England, very commonly with the latter, and in Scotland, almost always with the former. It is the most difficult of all the species of corn to save in a precarious harvest, and usually requires more labour in threshing and dressing, particularly in separating the *awns* from the grain, for which an apparatus called a *hummelling*-machine is sometimes added to the threshing-mill.

4. *Oats.*

Oats. This hardy grain is sown, with little preparation, on almost every kind of soil, and too often follows culmiferous crops, as well as pulse, herbage, and bulbous-rooted plants. Where a correct course of alternate white and green crops prevails, oats usually succeed clover; and it is almost always the first crop on land that has been several years in grass. As it prospers best on a soil not too finely pulverized, it is commonly sown on one earth.

Varieties. There are numerous varieties of this species, which are distinguished by colour, form, and the period of ripening; and by the names of the countries, such as the Poland and the Dutch, from whence they are understood to have been brought, or of the places where they were originally cultivated.* The chief of these are the common white variety, so well known as to need no description; the red; and what is called the potato-oat. For land in good cultivation, the two latter are probably the best,—the red for uplands exposed to high winds,—and the potato variety in lower situations. Both of these are early, and yield more abundantly, in grain as well as meal, than most others. The potato-oat is said to have been discovered by accident in Cumberland in 1788. (*Farmer's Magazine*, vol. xiv. p. 167.) But it is now very extensively raised, on suitable soils, in the north of England, and throughout the lowlands of Scotland. It usually brings a higher price at Marklane than any other variety. The red oat is so called from the colour of its husk: it has a thinner and more flexible stem, and the grain is more firmly attached to it, than in any of the early varieties; so that upon good soils, in high situations, as it is in less danger of suffering from wind, and is at the same time so much earlier than the common kinds, it is entitled to a decided preference, particularly in a late climate. It is understood to have originated in the county of Peebles, and is sometimes called the *Magbiehill-oat*, from the name of the estate where it was first cultivated.

Season of sowing.

Oats are sown, usually *broad-cast*, in the months of March and April, seldom earlier or later; and from four to six bushels are allowed to an acre. The produce, which varies greatly, from this grain being sown on land of every quality, may be stated generally at about five quarters per acre. They are often carried to the barn like hay, without being tied up in sheaves; but in the north they are either managed in the way already described for wheat, or set up in single sheaves or *gaits* as they are cut, and tied more tightly when ready to be carried, and then built in the stack-yard. Wherever a threshing-mill is employed, as it is necessary, in order to have the work done well, that corn should be presented to the rollers in a regular, uniform manner, the practice of mowing, and carrying it in a loose state, is highly improper; and, independently of this objection, the season often occasions much damage to corn managed in this slovenly manner, which it would have escaped in sheaves and covered shocks.

Value of straw as fodder.

The straw of oats is of more value as fodder than that of any other corn crop, and it is advantageously used as a substitute for hay during the winter months in some of the best cultivated districts, both for farm-horses and cattle.

5. *Peas and Beans.*

Peas and beans.

Since the introduction of clover and turnips, the culture of peas, which are almost everywhere a most precarious crop, has been greatly diminished. Their straw or haulm is sometimes more valuable than the grain produce, which, in a wet or late season, is frequently little more than the seed; and when the straw is not luxuriant, so much of the land is left exposed to the growth of weeds, that it is rendered unfit for carrying corn crops till cleansed by a fallow or fallow crop. Drilling is but an ineffectual remedy for these inconveniences, the stems falling over and covering the ground in so irregular a manner as in a great measure to prevent either horse or hand-hoeing at the time when it would be most beneficial. Yet a luxuriant crop of peas, by completely covering the surface, keeping the soil in a moist and mellow state, and preventing the growth of weeds, is a good preparation for either wheat or barley.

The culture of beans is almost confined to clays and strong loams in the best managed districts, turnip soils being by no means suited to this crop. Beans usually succeed wheat or oats, but sometimes also clover or pasture grass. The common horse-bean is the kind most generally cultivated; but large and small *ticks* are preferred in some of the English counties.

Modes of sowing.

Beans, though still sown *broad-cast* in several places, and sometimes *dibbled*, are for the most part drilled by judicious cultivators, or deposited after the plough in every furrow, or only in every second or third furrow. In the latter method, the crop rises in rows, at regular intervals of 9, 18, or 27 inches, and the hand-hoe ought invariably to be employed; but it is only where the widest interval is adopted that the horse-hoe can be used with much effect in their subsequent culture.

In the preparation of the land, much depends on the nature of the soil and the state of the weather; for as beans must be sown early in the spring, it is sometimes impossible to give it all the labour which a careful farmer would wish to bestow. It must also be regulated in some measure by the manner of sowing. But as we are decidedly of opinion that beans ought in general to be planted with such a distance between the rows as to admit of horse-hoeing, we shall confine ourselves to this mode of culture, which we think should be generally known, making use of the latest publication on the subject, which contains an accurate account of the different operations. (*General Report of Scotland*, vol. i. p. 515.)

Preparatory culture for beans.

In preparing ground for beans, it ought to be ploughed with a deep furrow after harvest or early in winter; and as two ploughings in spring are highly advantageous, the winter furrow may be given in the direction of the former ridges, in which way the land is sooner dry in spring than if it had been ploughed across. The second ploughing is to be given across the ridges, as early in spring as the ground is sufficiently dry; and the third furrow either forms the drills or receives the seed, as shall be mentioned immediately.

Dung is often applied to the bean crop, especially if it succeeds wheat. By some, dung is spread on the stubble previous to the winter ploughing; but this cannot always be done in a satisfactory manner, at least in the northern parts of the island, unless during frost, when it may lie long exposed to the weather before it can be turned down by the plough. The most desirable mode therefore is, to lay the manure into drills immediately before the beans are sown.

Sowing in rows.

There are, as already hinted, two several modes of drilling beans. In one of these, the lands or ridges are divided by the plough into ridgelets or *one-bout* stitches, at intervals of about 27 inches. If dung is to be applied, the seed ought first to be deposited, as it is found inconvenient to run the drill-machine afterwards. The dung may then be drawn out from the carts in small heaps, one row of heaps serving for three or five ridgelets; and it is evenly spread, and equally divided among them, in a way that will be more minutely described when treating of the culture of turnips. The ridgelets are next split out or reversed, either by means of the common plough or one with two mould-boards, which covers both the seed and the manure in the most perfect manner.

When beans are sown by the other method, in the bottom of a common furrow, the dung must be previously spread over the surface of the winter or spring ploughing. Three ploughs then start in succession, one immediately behind another, and a drill-barrow either follows the third plough, or is attached to it, by which the beans are sown in every third furrow, or at from 24 to 27 inches asunder, according to the breadth of the furrow-slice.

Another approved way of sowing beans, when dung is applied at seed-time, is to spread the dung, and to plough it down with a strong furrow; after which shallow furrows are drawn, into which the seed is deposited by the drill-machine. Whichever of these modes of sowing is followed, the whole field must be carefully laid dry by means of channels formed by the plough, and when necessary by the shovel; for neither then nor at any former period should water be allowed to stagnate on the land.

Time of sowing.

The time of sowing beans is as early as possible after the severity of winter is over; in the south sometimes in January, but never later than the end of March, as the ripening of the crop and its safe harvesting would otherwise be very precarious in this climate.

Quantity of seed.

The quantity of seed allowed is very different in the southern and northern parts of Britain; in the former, even when the rows are narrow, only two bushels or two bushels and a half; but in Scotland seldom less than four bushels to the English statute acre, even when sown in ridgelets 27 inches distant, and a bushel more when sown *broad-cast*.

Beans and peas mixed.

Both in the broad-cast and drill husbandry it is common to mix a small quantity of peas along with beans. This mixture improves both the quantity and quality of the straw for fodder; and the peas-straw is useful for binding up the sheaves in harvest.

After-culture.

The bean crop is generally harrowed to destroy annual weeds; sometimes just before the plants make their appearance, and sometimes after the beans have got their first green leaves, and are fairly above ground. When sown in rows in either of the modes already mentioned, the harrows are employed about ten or twelve days after; and, being driven across the ridgelets, the land is laid completely level for the subsequent operations.

After the beans have made some growth, sooner or later, according as the soil may happen to be encumbered with or free from weeds, the horse-hoe is employed in the interval between the rows, and followed by the hand-hoe for the purpose of cutting down such weeds as the horse-hoe cannot reach: all the weeds that grow among the beans beyond the reach of either hoe should be pulled up with the hand. The same operations are repeated as often as the condition of the land in regard to cleanness may require.

Before the introduction of the horse-hoe, which merely stirs the soil, and cuts up the weeds, a common small plough, drawn by one horse, was used in working between the rows, and is still necessary where root-weeds abound. This plough goes one bout, or up and down in each interval, turning the earth from the beans, and forming a ridgelet in the middle: then hand-hoes are immediately employed; and after some time a second hand-hoeing succeeds, to destroy any fresh growth of weeds. The same plough, with an additional mould-board, finally splits open the intermediate ridgelet, and lays up the earth to the roots of the beans on each side. The benefit of laying up the earth in this manner, however, is alleged to be counterbalanced by the trouble which it occasions in harvest, when it is difficult to get the reapers to cut low enough, and may be properly dispensed with, unless the soil be very wet and level.

Reaping.

In an early harvest, and when the straw is not immoderately rank, the bean crop becomes ripe in good time, and is easily prepared for the stack-yard. But in moist warm seasons the grain hardly ever ripens effectually, and it is exceedingly difficult to get the straw into a proper condition for the stack. In such cases it has been found of advantage to switch off the succulent tops with an old scythe blade set in a wooden handle, with which one man can easily top-dress two acres a day. This operation, it is said, will occasion the crop to be ready for reaping a fortnight earlier, and also perhaps a week sooner ready for the stack-yard after being reaped. In order to have the land prepared for a wheat crop, beans are sometimes removed from the ground, and set up to dry in another field.

The most approved mode of reaping beans is with the sickle, but they are sometimes mown, and in a few instances even pulled up by the roots. They should be cut as near the ground as possible, for the sake of the straw, which is of considerable value as fodder, and because the best pods are often placed on the stems near the roots. They are then left for a few days to wither, and afterwards bound and set up in the shock to dry, but without any head-sheaves.

Beans are built in circular or oblong stacks, often in the latter form; and it is always proper, if the stack be large, to construct one or more funnels, to allow a free circulation of air. They may be threshed by the mill, and dressed by the winnowing-machine, like any other grain.

Produce and consumption.

The produce of beans, like that of other pulse crops, is exceedingly precarious, and probably does not exceed upon an average three quarters per acre. That of peas, as we have observed, is still more uncertain. But the haulm of both is valuable in the feeding of live stock; and the bean crop comes in on clay soils as a preparative for wheat, thus postponing the recurrence of a naked fallow. The consumption of peas and beans is chiefly in the feeding of horses and hogs; but the proportion in which the former is grown in the best courses of husbandry is comparatively inconsiderable.

In the neighbourhood of London and some other large towns, varieties of the pea are cultivated for supplying green peas at an early period of the season, which at that time bring a very high price; but this belongs to gardening rather than to agriculture.

6. *Tares.*

Tares.

The tare, though cultivated for its stems and leaves rather than for its fruit or seeds, is so similar to the pea in its habits and mode of culture, that it seems proper to mention it in this place.

Varieties.

The common tare is distinguished into two sorts, the *winter* and *spring* tare. It is the opinion of an eminent botanist that they are the same plant (Walker's *Hebrides*, vol. i. p. 228); but though this may have been true of the tare in its natural state, there is reason to believe that a material difference now exists, superinduced perhaps by cultivation. (*Annals of Agriculture*, vol. ii.) The winter tare, by the experiments detailed in the work just referred to, escaped injury from frosts which destroyed the spring variety. The difference in the colour and size of the seeds is, however, so inconsiderable as to be scarcely distinguished; but "the winter tare vegetates with a seed leaf of a fresh green colour, whereas the spring tare comes up with a grassy spear of a brown dusky hue." (Dickson's *Practical Agriculture*, vol. ii. p. 869.)

Season of sowing.

The winter variety is sown in September and October, and the first sowing in spring ought to be as early as the season will permit. If they are to be cut green for soiling throughout the summer and autumn, which is the most advantageous method of consuming them, successive sowings should follow till the end of May. The quantity of seed to an acre is from 2½ to 3½ bushels, according to the time of sowing, and as they are to be consumed green or left to stand for a crop.

Sometimes eaten on the ground.

Tares are in some places eaten on the ground by different kinds of live stock, particularly by sheep; and as the winter-sown variety comes very early in spring, the value of this rich food is then very considerable. The waste, however, in this way, even though the sheep be confined in hurdles, must be great; and still greater when consumed by horses or cattle. But if the plants be cut green, and given to live stock either on the field or in the fold-yards, there is, perhaps, no green crop of greater value, nor any better calculated to give a succession of herbage from May to November. The winter-sown tare, in a favourable climate, is ready for cutting before clover; the first spring crop comes in after the clover must be all consumed or made into hay; and the successive spring sowings give a produce more nourishing for the larger animals than the aftermath of clover, and may afford green food at least a month longer.

A little rye sown with winter tares, and a few oats with the spring sort, not only serve to support the weak creeping stems of the tares, but add to the bulk of the crop by growing up through the interstices.

Culture.

There is little difference in the culture of tares and of peas; they are often sown broad-cast, but sometimes in rows, with intervals to admit of hand-hoeing. The land ought to be rolled as a preparation for mowing; and they should always be cut with the scythe rather than with a sickle, which, by tearing up a number of the plants by the roots, renders the second growth of little or no value. When cut with the scythe, even an early spring-sown crop sometimes yields a tolerable after-crop.

In those districts where winter-sown tares are found to succeed, which is not the case in the north, the ground may be cleared in time for being sown with turnips, or dressed like a fallow for wheat to be sown in autumn.

7. *Potatoes.*

Varieties.

The varieties of this root are so numerous, that it would be hardly possible to give the names of them all. They differ not only in quality, being more or less farinaceous, but in the appearance of their leaves, haulm, and flowers, and in their time of ripening, as well as in the colour of the roots. Among those most commonly grown in the fields, the latter is the most obvious distinction. They are either of a white or of a purple colour approaching to black; the former being in most repute during the early months of winter, and the latter in the spring and summer months. The kind most generally cultivated round London is the early champion, which is very hardy, prolific, and farinaceous. The yam or Surinam potato, the oxnoble, and the late champion, are grown exclusively for live stock. New varieties may be easily obtained from the seed contained in the apple. The earlier varieties, indeed, do not usually carry any flower; but by removing the earth from the roots, and the small potatoes themselves as they began to form, Mr Knight, the president of the Horticultural Society, succeeded in forcing the plant into blossom, and thus obtained seeds from the early as well as the common kinds.

The potato is planted in almost every description of soil, but thrives best in one that is somewhat loose and porous. In many parts of Ireland it is the practice to plant them upon what are called lazy-beds, the sets being placed upon the surface and covered with earth taken out of a trench formed around them.

Preparation of the soil.

Under the best management, the land is prepared for the potato much in the same manner as for the turnip. It is of much importance to free it as completely as possible from weed-roots, which cannot be so well extirpated afterwards, as in the culture of turnips and other drilled crops, both because the horse-hoe must be excluded altogether at a time when vegetation is still vigorous, and because at no period of their growth is it safe to work so near the plants, especially after they have made some progress in growth. It is the earlier time of planting and of finishing the after-culture that renders potatoes a very indifferent substitute for fallow, and, in this respect, in no degree comparable to turnips. For this reason, as well as on account of the great quantity of manure required, their small value at a distance from large towns, and the great expense of transporting so bulky a commodity, the culture of potatoes is by no means extensive in the best-managed districts. Unless in the immediate vicinity of such towns, or in very populous manufacturing counties, potatoes do not constitute a regular rotation crop, though they are raised almost everywhere to the extent required for the consumption of the farmer and his servants, and in some cases for occasionally feeding horses and cattle, particularly late in spring.

Planting and culture.

The first ploughing is given soon after harvest, and a second, and commonly a third, early in spring. The land is then laid up into ridgelets from 27 to 30 inches broad, as for turnips, and manured in the same manner. The usual season of planting potatoes in the fields is April, but it frequently continues till the middle of May. A week or two before the planting begins, the roots are cut into pieces or sets, each having at least one *eye*; what is called the *nose-end* of the root being the most valuable for this purpose. Under the drill system the sets are placed in the bottom of the furrow, between the ridgelets, at from four to eight inches distance, and the ridgelets then reversed to cover them. But in some places they are still planted after the plough, commonly in every third furrow; by which means they rise in rows, at much the same distance as in the former case, and admit of nearly the same after-culture. In either case the land remains untouched till the tops of the plants begin to rise above the surface, when it is usual to harrow slightly across the ridges; and afterwards the horse-hoe or small hoeing-plough and the hand-hoe are repeatedly employed in the intervals and between the plants, as long as the progress of the crop will permit, or the state of the soil may require. The earth is then gathered once or oftener, from the middle of the intervals towards the roots of the plants, after which any weeds that may be left must be drawn out by hand; for when the radicles have extended far in search of food, and the young roots begin to form, neither the horse nor hand-hoe can be admitted without injury.

Gathering the crop.

Potatoes are usually taken up with the common plough, but sometimes with three-pronged forks: the plough goes twice along each ridgelet, in such a manner as not materially to injure any of the roots with its share or coulter, and the potatoes are gathered by women and children placed along the line at proper distances. When the land is somewhat moist, or of a tenacious quality, the furrow-slice does not give out the roots freely, and a harrow, which follows the plough, is commonly employed to break it and separate them from the mould. Various contrivances have been resorted to for this purpose: a circular harrow or brake to be attached to the plough (see Plate VII.) has been found to answer the purpose well, and to effect a considerable saving of labour.

Improvements suggested.

Various suggestions have been offered for the purpose of improving the cultivation of this root. Instead of cutting the roots to be planted into sets, some have recommended the planting of them whole, and others have thought that a great saving of the root might be made by scooping out the sets. See Plate X. Several experiments have been made to augment the produce and accelerate the ripening of potatoes, by plucking off the blossoms from the *shaws* or haulm. But none of these innovations has yet entered into general practice, and the trials have not been so numerous nor so satisfactory as to warrant any conclusions of real utility.

Preservation through winter.

The potato crop is preserved through winter, sometimes in houses, but more generally perhaps in some convenient place near the farm-buildings, in *camps, pies*, or *pits*, covered first with straw, and then with earth dug up around the heaps in the form of a trench, which discharges any water that might otherwise lodge about the bottoms.

Produce and consumption.

The produce per acre may vary from five or six to ten or twelve tons; but the average, perhaps, cannot be stated at more than six or seven. The potato is for the most part consumed after no other preparation than boiling or roasting, and unfortunately it is not fit for being stored up and kept over from one year to another. To make it more generally useful, it has been recommended to convert its farinaceous matter into flour, in which state, if well dried and closely packed, it may be preserved for several years. Its flour has been recommended for a variety of culinary preparations, and is said to be often used in place of arrow-root in the medical treatment of patients in the hospitals of the Continent. Ardent spirits have also been obtained from potatoes, even after they had been so injured by frost as to be useless for any other purpose. (*Farmer's Magazine*, vol. xvii. p. 325.)

The curl is the most destructive disease to which this plant is liable; and the only preventive hitherto known is a change of seed or sets. It is a prevailing opinion that it is occasioned by the over-ripeness of the plants used as seed; and it is therefore the practice to take up what is intended for seed some weeks before they are fully ripe. Others prefer bringing their seed from a colder situation, the success of the change probably depending upon the circumstance of the roots not being fully ripened.

8. *Turnips.*

Turnips.

Turnips and clover are the two main pillars of the best courses of British husbandry. They have contributed more to preserve and augment the fertility of the soil for producing grain, to enlarge and improve our breeds of cattle and sheep, and to furnish a regular supply of butcher-meat all the year, than any other crops; and they will probably be long found vastly superior, for extensive cultivation, to any of the rivals which have often been opposed to them in particular situations.

Soils.

Turnips cannot be advantageously cultivated on wet, tenacious clays, but are grown on all comparatively dry soils, under all the variations of our climate. On dry loams, and all soils of a looser texture, managed according to the best courses of cropping, they enter into the rotation to the extent of a fourth, a sixth, or an eighth part of the land in tillage; and even on clayey soils they are frequently cultivated, though on a smaller scale, to be eaten by cattle, for the purpose of augmenting and enriching the manure into which the straw of corn is converted.

Drill culture of Scotland.

It will be sufficient in this place to describe the practices of the best managed counties of Scotland in regard to the culture of turnips, which are universally raised in rows at such a distance as to admit of horse-hoeing; and every step of the process is conducted with much accuracy and success.

The varieties commonly cultivated by the best farmers are, the *white globe*, which comes early and gives a very weighty crop, but often suffers much from the frosts of winter; the *yellow*, which is more hardy, and answers well for succeeding the *globe* in spring; and the *ruta baga*, or *Swedish*, which may be preserved for consumption till the end of May.

The drill culture of turnips was first firmly established in Scotland by the practice of Mr William Dawson, a farmer at Frogden, in the county of Roxburgh, soon after his entry to that farm in 1759. Turnips had been sown indeed on narrow ridges, according to the practice of Tull, many years before that period; but chiefly by proprietors, upon a very small scale; and the several operations were neither so correct, so uniform, nor so much simplified as to induce general imitation. The first person who ever formed turnip ridges in Scotland with a two-horse plough without a driver was instructed by Mr Dawson, and died only a few years ago.

Preparation of the soil.

In the drill culture of turnips, the land is ploughed with a deep furrow soon after harvest, usually in the direction of the former ridges, though, if the soil be dry, it is of little consequence in what direction. As soon as the spring seed-time is over, a second ploughing is given across the former, and the harrows, and, if necessary, the rollers, are then set to work to clean and pulverize the soil. All the weed-roots that are brought to the surface are carefully gathered into heaps, and either burnt on the ground, or carried off to form a compost, usually with lime. The land is then generally ploughed a third time, again harrowed well, sometimes also rolled, and the weed-roots picked out as before. Unless land is in a much worse state, in regard to cleanness and pulverization, than it usually is after turnips have been for some time a rotation crop, no more ploughings are necessary. It is next laid up in ridgelets from 27 to 30 inches wide, either with the common swing-plough, or one with two mould-boards, which forms two sides of a ridgelet at once.

Manuring.

Well-rotted dung, at the rate of 12 or 15 tons per acre, is then carried to the field, and dropt from the cart in the middle one of three intervals, in such a quantity as may serve for that and the interval on each side of it. The dung is then divided equally among the three by a person who goes before the spreaders, one of whom for each interval spreads it with a small three-pronged fork along the bottom. The plough immediately follows, and, reversing the ridgelets, forms new ones over the dung; and the drill-barrow, commonly one that sows two drills at once, drawn by one horse, deposits the seed as fast as the new drills are formed.

Sowing.

This drill machine is usually furnished with two small rollers; one that goes before the sowing apparatus, and levels the pointed tops of the ridgelets, and another that follows for the purpose of compressing the soil and covering the seed. From the time the dung is carted to the ground, until the seed is deposited, the several operations should go on simultaneously: the dung is never allowed to lie uncovered to be dried by the sun and the wind; and the new ridgelets are sown as soon as formed, that the seed may find moisture to accelerate its vegetation.

Time of sowing.

The time of sowing the several varieties is somewhat different; the *Swedish* should be put in the earliest, and then the *yellow*,—both of them in the month of May. But as these kinds are much less extensively cultivated than the *globe*, the month of June is the principal seed-time; and after the first week of July a full crop is not to be expected in the northern parts of the island. The quantity of seed most commonly allowed is two pounds to the acre, which, though much more than sufficient to stock the ground with plants, is thought to be necessary for insuring a regular crop on most soils. The supernumerary plants are easily taken out with the hoe; but if any parts are missed, they can be filled up only by inserting a few Swedish plants: the other varieties seldom succeed after transplantation.

Culture while growing.

As soon as the plants have put forth the *rough leaf*, or sooner if annual weeds have got the start of them, a horse-hoe is run between the ridgelets, which cuts up the weeds on each side, almost close to the rows of the turnip plants, clearing out the bottom of the interval at the same time. The hand-hoers are always set to work as soon after as possible, and the plants are left about nine inches distant—the Swedish kind somewhat closer. If the ground has been well prepared, and the plants not allowed to get too large, three experienced hoers go over an acre a day. A few days after this a small swing-plough, drawn by one horse, enters the interval between the rows, and, taking a furrow-slice off each side, forms a smaller ridgelet in the middle. If the annuals still rise in great abundance, the horse-hoe may be employed again, otherwise the next operation is to go over them a second time with the hand-hoe, when the intermediate ridgelet is levelled. Sometimes a third hoeing must be given; but that is done very expeditiously. When no more manual labour is required, a small plough with two mould-boards is employed to lay up the earth to the sides of the plants, leaving the ridgelets of the same form as when sown, which finishes the process. Large fields, dressed in this manner throughout their whole extent, are left as clean and as pleasant to the eye as the best cultivated garden. The horse and hand-hoeing in ordinary cases may cost about fifteen shillings per acre.

Where the soil is perfectly dry, and has been well prepared, the small plough has of late been laid aside by many farmers, and the space between the rows is kept clean by the horse and hand-hoe alone; but if the soil be either wet from springs, or so flat as not easily to part with surface water, it is still considered proper to earth up the roots as the concluding part of the process; and it is always useful to plough between the ridges when couchgrass and other weeds have not been completely picked out before the land was sown.

The gathering of the weeds, the spreading of the dung, and the hand-hoeing, are almost always performed by women and boys and girls.

Weight of crop.

A good crop of white globe turnips weighs from 25 to 30 tons per acre, the yellow and Swedish commonly a few tons less. Of late there have been instances of much heavier crops; and in Ayrshire it would appear that above 60 tons have been raised on an English acre, the leaves not included. (*Farmer's Magazine*, vol. xv. and xvi.) But such an extraordinary produce must have been obtained by the application of more manure than can be provided, without injustice to other crops, from the home resources of a farm; and where turnips form a regular crop in the rotation, no such produce is to be expected under any mode of culture.

Consumption.

Turnips are consumed either on the spot where they grow, on grass fields, in fold-yards, or in feeding-houses; the far greater part, wherever they are extensively cultivated, by sheep. The price per acre when sold depends not only upon the weight of the crop, but also on the mode of its consumption.

When eaten by sheep in the place of their growth, turnips are lotted off, by means of hurdles or nets, that they may be regularly consumed. When the first allowance is nearly eaten up, the bottoms or shells are picked out of the ground by means of a two-pronged blunt hook adapted to the purpose; and then another portion of the field is taken in, by shifting the hurdles or nets; and so on regularly until the whole are finished; the cleared part of the field being usually left accessible as a drier bed for the sheep, and that they may pick up the shells that remained when a new portion of the field was taken in.

The turnips required for other modes of consumption are usually drawn out at regular intervals before the sheep are put upon the field; unless the soil be so poor as to need all the benefit of their dung and treading, in which case the whole are consumed where they grow; or so rich as to endanger the succeeding crops, by eating any part of the turnips on the ground. In the latter very rare instance, the whole crop is carried to be consumed elsewhere, as must always be done if the soil be naturally too wet for sheep feeding.

In wet weather, when sheep ought not to be allowed to lie on the turnip field, it becomes necessary to carry the turnips to a grass field; and store sheep, not requiring to be so highly fed, frequently eat their turnips on such fields, as well as rearing cattle, and sometimes milch cows. A grass field contiguous to the turnip one is always very desirable, that the sheep, confined on other sides by hurdles or nets, may always find a dry place to lie on.

In the distribution of turnips among young cattle, and sheep in their first year, towards spring, when the loosening and shedding of their teeth render them unable to break the hard roots, it is usual to cut or slice the turnip, either by means of a spade or chopping-knife, or by an implement constructed for the purpose, called a turnip-slicer, formerly mentioned; or they are crushed by means of a heavy wooden mallet.

During severe frosts, turnips become so hard that no animal is able to bite them. The best remedy in this case is, to lay them for some time in running water, which effectually thaws them; or, in close feeding-houses, the turnips intended for next day's use may be stored up over night in one end of the building, and the warmth of the animals will thaw them sufficiently before morning. But in those months when frosts are usually most severe, it is advisable to have always a few days' consumption in the turnip-barn, formerly mentioned. When a severe frost continues long, or if the ground be covered deep with snow, potatoes ought to be employed as a substitute.

The advantages of eating turnips on the place of their growth by sheep, both in manuring and consolidating the ground, are sufficiently well known to every farmer. One great defect of the inferior sort of turnip soils is the want of tenacity; and it is found that valuable crops of wheat may be obtained upon very light, porous soils, after turnips so consumed.

Value.

The value or price by the acre is so various, from differences in soil and seasons, and fluctuates so much according to the degree of abundance and demand, that nothing can be decisively stated on this subject. It likewise varies according to the modes of application, as above noticed. A farmer who has turnips to sell will demand more money per acre, if they are to be drawn and consumed by the purchaser in the fold-yard, or on the pastures of the farm, than if eaten by sheep where they grow; and will require a much higher price if they are to be carried off the farm. Indeed, hardly any price will compensate for such abstraction of manure, and consequent loss of future fertility, unless where manure can be readily purchased to supply the defalcation; and that can only be done by those who are situated near towns and large villages, where a few turnips may be sold in that way for the cows of the inhabitants. Eight guineas an acre is considered a good price, in seasons of uncommon demand, for a full crop; five guineas in ordinary years; and down to thirty and forty shillings for inferior crops. Upon an average of years, five guineas may be reckoned a fair price for a good crop, eaten by sheep where they grow. Near large towns, where turnips are in demand by cowfeeders, they will sell in ordinary years for double, and when in extraordinary demand, for three or even four times these prices; but in these cases they are always removed from the farm, and consequently the manure which they produce is lost to the soil.

Price per week.

It is not uncommon to let turnips at an agreed price, or board, for each sheep or beast weekly. This varies, according to age and size and the state of the demand, from fourpence or less to eightpence or more for each sheep weekly, and from two shillings to five for each beast. An acre of good turnips, say 30 tons, with straw, will fatten an ox of 60 stone, or 10 Leicester sheep. Supposing the turnips worth six guineas, this may bring the weekly keep of the ox to 6s. 3½d. and of the sheep to about 7½d. a week. In this way of letting, however, disputes may arise, as the taker may not be careful to have them eaten up clean.

The person who lets the turnips has to maintain a herd for the taker; and when let for cattle, and consequently to be carried off, the taker finds a man and horse, and the letter maintains both. The taker has to provide hurdles or nets for fencing the allotments to sheep, but the letter must fence his own hedges if necessary. The period at which the taker is to consume the whole is usually fixed in the agreement, that the letter may be enabled to plough and sow his land in proper season.

Storing.

Common turnips are seldom stored in any great quantity, though sometimes a portion is drawn and formed into heaps like potato camps, and lightly covered with straw, or preserved for some time under a shed. On these occasions the shaws or leaves and the tap-roots must be cut off and removed before storing up, to prevent heating and rotting. The heaps must not be covered with earth like potatoes, for in this case their complete destruction is inevitable. This root contains too much water to be preserved for any length of time in a fresh and palatable state after being removed from the ground; and though the loss in seasons unusually severe, particularly in the *white globe* variety, is commonly very great, it is probable that a regular system of storing the whole, or the greater part of the crop every season, would upon an average of years be attended with still greater loss; besides, the labour and expense, where turnips are cultivated extensively, would be intolerable. Yet it has become a practice in some parts, particularly in Norfolk, to preserve a portion of the turnip crop through the winter, by what is called *placing*. They are removed from the field where they grow, and the tap-roots being taken off, the bulbs, with the haulm on, are placed close together in the position in which they grew, upon some dry, sheltered spot near the farm-houses, where they are ready for use as wanted; and in this way, with little or no artificial shelter, they are found to keep in a fresh state longer than if they had been left in the field.

Placing.

Diseases.

Besides the damage sustained by a turnip crop from beetles and other insects, a very destructive disease, formerly confined to particular districts, has lately begun to extend itself in an alarming manner; and there is reason to fear, if some means of prevention be not soon discovered, that it may almost put an end to the cultivation of this root, in some situations where it is of essential importance, both with a view to the produce of grain and to the rearing and fattening of live stock. In Holderness it is known by the quaint name of *fingers and toes*, from the shapes into which the disease distorts either the bulb or tap-root, or frequently both. An ingenious paper on this subject was read to the Holderness Agricultural Society in 1811, by Mr William Spence, their president, from which we shall abstract some account of this hitherto local disease.

Fingers and toes.

In some plants the bulb itself is split into several finger-diverging lobes. More frequently the bulb is, externally, tolerably perfect, and the tap-root is the part principally diseased, being either wholly metamorphosed into a sort of mis-shapen secondary bulb, often larger than the real bulb, and closely attached to it, or having excrescences of various shapes, frequently not unlike human toes (whence the name of the disease), either springing immediately from its sides or from the fibrous roots that issue from it. In this last case each fibre often swells into several knobs, so as distantly to resemble the wire and accompanying tubers of a potato; and not seldom one turnip will exhibit a combination of all these different forms of the disease. These distortions manifest themselves at a very early stage of the turnip's growth; and plants scarcely in the rough leaf will exhibit excrescences, which differ in nothing else than size from those of the full-grown root.

The leaves discover no unusual appearance, except that in hot weather they become flaccid and droop; from which symptom the presence of the disease may be surmised without examining the roots. These continue to grow for some months, but without attaining any considerable size, the excrescences enlarging at the same time. If divided at this period with a knife, both the bulb and the excrescences are found to be perfectly solid, and internally to differ little in appearance from a healthy root, except that they are of a more mealy and less compact consistence, and are interspersed with more numerous and larger sap-vessels. The taste, too, is more acrid; and on this account sheep neglect the diseased plants. Towards the approach of autumn, the roots, in proportion as they are more or less diseased, become gangrenous and rot, and are either broken (as frequently happens) by high winds, or gradually dissolved by the rain. Some which have been partially diseased survive the winter; but of the rest at this period, no other vestige remains than the vacant patches which they occupied at their first appearance.

This disease, according to Mr Spence, is not owing to the seed, nor to the time of sowing, nor to any quality of the soil, either original, or induced by any particular mode of cropping or of tillage; and he adds, "that the most attentive and unbiassed consideration of the facts has led him to infer that the disease, though not produced by any insect that has yet been discovered, is yet caused by some unobserved species, which, either biting the turnip in the earliest stage of its growth, or insinuating its egg into it, infuses at the same time into the wound a liquid, which communicates to the sap-vessels a morbid action, causing them to form the excrescences in question."

With regard to the prevention of this disease, marl has been recommended by Sir Joseph Banks and others; and where marl cannot be procured, it has been thought that an addition of mould of any kind that has not borne turnips will be advantageous; such as a dressing taken from banks, headlands, ditches, &c. and mixed up with a good dose of lime. But lime alone has been tried in vain; and no great dependence can be placed upon fresh mould, as this disease has been known to prevail upon lands that had scarcely ever before borne a crop of turnips. (*Farmer's Magazine*, vol. xiii.)

9. *Mangold Wurzel.*

Mangold wurzel.

The mangold wurzel, or field-beet, is cultivated in much the same manner as turnip, and used in the same way in the feeding of live stock. It has been long grown in Germany, Switzerland, and other parts of the Continent, but has been but recently introduced into Britain, and is still cultivated here only upon a small scale. Very heavy crops have been raised upon clay; a circumstance which is alleged to be in favour of introducing it into the general rotation; but the same thing is true of turnip, the difficulty consisting not in the productive power of such a soil, but in its preparation and the carrying away of the crop. As the sowing of mangold wurzel should not be deferred beyond the middle of April, it must rarely be practicable to have heavy land in a suitable condition so early. Like the Swedish turnip, however, it admits of being transplanted, which may be done in May, so as to give more time for preparing the soil.

The produce in ordinary cases is much the same as that of the Swedish turnip, but it is understood to contain a greater proportion of nutritive matter. Near London it is in much repute for the feeding of milch cows. The tops are taken off first and given by themselves; and afterwards the roots, which are more liable to be injured by frost than the Swedish turnip.

10. *Carrots.*

Carrots.

This crop, it is well known, requires a deep soil, inclining to sand, and cannot therefore be so generally cultivated as turnips. But it has been too much neglected on lands where it would have yielded a more valuable product, perhaps, than any bulbous or tap-rooted plant whatever. Several contradictory experiments in its culture have been detailed in a number of publications, from which the practical husbandman will be at a loss to draw any definite conclusion. But in a communication to the Board of Agriculture, from Mr Robert Burrows, an intelligent Norfolk farmer, who has cultivated carrots on a large scale and with great success for several years, so accurate an account is presented of the culture, application, and extraordinary value of this root, that carrots will probably soon enter more largely into the rotation of crops on suitable soils. We shall give the substance of this communication in his own words.

Quantity of seed.

"I usually sow seed of my own growth, from eight to ten pounds per acre: if purchased, the price is in general from one shilling to one shilling and sixpence per pound. By sowing seed of my own growing, I am enabled to speak both to the nature of its stock, and likewise its quality in regard to newness. The latter circumstance is of particular consequence in obtaining a full and healthy plant, and not always to be guarded against if the seed is purchased of the seedsman. Having weighed the quantity of seed to be sown, and collected sand or fine mould in the proportion of about two bushels to an acre, I mix the seed with the sand or mould, eight or ten pounds to every two bushels; and this is done about a fortnight or three weeks before the time I intend sowing, taking care to have the heaps turned over every day, sprinkling the outside of them with water each time of turning over, that every part of the sand heaps may be equally moist, and that vegetation may take place alike throughout. During this time the land is preparing with a good dressing of manure, of about sixteen cart-loads per acre of rotten farm-yard manure or cottagers' ashes; the load about as much as three able horses can draw, and, if bought, costs about four shillings and sixpence per load, besides the carting on the land. I usually sow my wheat stubbles after clover; plough the first time in autumn, and once more in the early part of the month of February, if the weather permits; setting on the manure at the time of sowing, which is about the last week in March, or sometimes as late as the second week in April; but have generally found early-sown crops the most productive. I have great advantage in preparing the seed so long beforehand: it is by this means in a state of forward vegetation, therefore lies but a short time in the ground, and, by quickly appearing above ground, is more able to contend with those numerous tribes of weeds in the soil whose seeds are of quicker vegetation.

Time of sowing.

Hoeing.

"Within about five or six weeks the carrots are ready to hoe; and, upon an average of six years, on a light sandy loam, they have cost me L.1. 10s. 8d. per acre hoeing; usually performed three, and sometimes four times, or until the crop is perfectly clean. The first hoeing is with hoes four inches long, and two and a quarter inches wide; the second hoeing invariably takes place as soon as the first is completed, and is performed with six-inch hoes, by two and a quarter inches wide. By this time the plants are set; the first time of hoeing nothing was cut but the weeds. I endeavour to leave the carrots nine inches apart from each other; sometimes they will be a foot or even farther asunder.

Time of taking up.

"No other expense now attends the crop until the time of taking them up, which is usually about the last week in October, as at that time I generally finish soiling my horses with lucerne, and now solely depend upon my carrots, with a proper allowance of hay, as winter food for my horses, until about the first week of June following, when the lucerne is again ready for soiling. By reducing this practice to a system, I have been enabled to feed ten cart-horses throughout the winter months for these last six years, without giving them any corn whatever, and have at the same time effected a considerable saving of hay from what I found necessary to give to the same number of horses when, according to the usual custom of the country, I fed my horses with corn and hay. I give them to my cart-horses, in the proportion of 70 lb. weight of carrots a horse per day upon an average, not allowing them quite so many in the very short days, and something more than that quantity in the spring months, or to the amount of what I withheld in the short winter days. The men who tend the horses slice some of the carrots in the cut chaff or hay, and barn-door refuse; the rest of the carrots they give whole to the horses at night, with a small quantity of hay in their racks: and with this food my horses generally enjoy uninterrupted health. I mention this, as I believe some persons think that carrots *only*, given as food to horses, are injurious to their constitutions; but most of the prejudices of mankind have no better foundation, and are taken up at random, or inherited from their grandfathers.

"So successful have I been with carrots as a winter food for horses, that with the assistance of lucerne for soiling in summer, I have been enabled to prove, by experiments conducted under my own personal inspection, that an able Norfolk team-horse, fully worked two journeys a day, winter and summer, may be kept the entire year round upon the produce of only one statute acre of land. I have likewise applied carrots with great profit to the feeding of hogs in winter, and by that means have made my straw into a most excellent manure, without the aid of neat cattle: the hogs so fed are sold on Norwich hill to the London dealers as porkers. The profit of carrots so applied I shall likewise show in my subsequent statement; together with an experiment of feeding four Galloway bullocks with carrots, against four others fed in the common way with turnips and hay.

Mode and expense of raising the crops.

"The taking up of the crop is put out to a man, who engages women and children to assist him: the work is performed with three-pronged forks. The children cut off the tops, laying them and the roots in separate heaps, ready for the teams to take away. The expense altogether L.1. 1s. per acre, of not less than seven or eight hundred Winchester bushels. The carting away depends upon the distance of the place where carried to: if not far, the expense will be 15s. to 18s. per acre. The value of carrot tops given to bullocks and sheep in the first winter quarter more than repays the two last-mentioned expenses. I take up in autumn a sufficient quantity to have a store to last me out any considerable frost or snow that may happen in the winter months; the rest of the crop I leave in the ground, preferring them fresh out of the earth for both horses and bullocks. For the former, perhaps, it would be as well to wash the roots when they are very wet and dirty, though I by no means think washing generally necessary. The carrots keep best in the ground, nor can the severest frosts do them any material injury. The first week in March it is necessary to have the remaining part of the crop taken up, and the land cleared for barley. The carrots can either be laid in a heap with a small quantity of straw covered over them, or they may be laid into some empty outhouse or barn in heaps of many hundred bushels, provided they are put together dry. This latter circumstance it is indispensably necessary to attend to; for, if laid together in large heaps when wet, they will certainly sustain much injury. Such as I want to keep for the use of my horses until the months of May and June, in drawing over the heaps (which is necessary to be done the latter end of April, when the carrots begin to sprout at the crown very fast) I throw aside the healthy and most perfect roots, and have their crowns cut completely off and laid by themselves. By this means carrots may be kept the month of June out in a high state of perfection." (*Communications to the Board of Agriculture*, vol. vii. p. 72.)

Total expense per acre.

Average produce.

Value.

Mr Burrows next proceeds to state the expense of his crops for four years successively, in which he cultivated forty-nine acres in all; the average of the first three years being L.10. 13s. 2½d. and the expense of the last year, when he had twenty-five acres, L.8. 8s. 4d. per acre. In these sums, rent, interest of capital, and all other charges are included. He then details at some length the application of the crops, averaging upwards of 800 bushels per acre, to the feeding of cart-horses, hogs, and cattle—both milch cows and fattening bullocks,—from which there appears to result a clear profit on the first three crops of no less than L.27. 18s. 3½d. per acre. The fourth crop of twenty-five acres was sold to the tenant who succeeded him in his farm at twenty guineas per acre, the price fixed by neutral men, leaving him a profit of L.12. 11s. 8d. per acre. Mr Burrows was so well convinced of the great advantages of this management, that he began with sixteen acres of carrots on his new farm; and we are told, that the cultivation of this root is becoming more extensive, in consequence of his successful practice.

Cultivated in rows.

Carrots in many instances are sown by hand in rows, at narrow intervals for hand-hoeing, the seeds not being easily deposited in a regular manner by the use of the drill-machine. The hand-hoeing is certainly performed more correctly, and with much less labour, when the plants are cultivated in rows.

11. *Parsnip.*

Parsnip.

The parsnip has a root like the carrot; and the soil, preparation, and manure, as well as the after-culture, are nearly the same for both. The quantity of seed when sown in drills is from 4 to 5 lbs. per acre, but in broadcast 6 or 8 lbs. About the middle of February is the usual sowing season, but sometimes September; and the breadth of the drills when sown in this way is 15 or 18 inches. In the island of Jersey, where it is most extensively cultivated, beans are commonly grown along with it, the beans being first dibbled in, and the parsnip seed afterwards sown, broad-cast. For fattening cattle it is considered equal, if not superior to the carrot, and gives an exquisite flavour and a juicy quality to the meat. About 30 lbs. of the root is the usual allowance to an ox at each meal, with a little hay between. When milch cows are fed with this root and hay in winter, the colour and quality of the butter are said to be equal to what is produced by the best pastures. Yet after all, both carrot and parsnip require so much labour, and are such uncertain crops in most parts of Britain, that they cannot be said to enter into the general rotation.

12. *Rape.*

Rape.

Rape is now grown to a considerable extent in some districts, not only for the sake of the oil expressed from its seed, but also for feeding sheep on land not well adapted to turnips. It is cultivated on a variety of soils, as a first crop after paring and burning, and when old grass lands are brought into tillage; and it often yields a very valuable crop. Upon lands kept under the plough it comes into the rotation as a green crop; and the preparation and after-culture are the same as for turnips; and it is sown much about the same time, or a little later, but may also be transplanted from a seed-bed so late as September or October. A variety of this plant is largely cultivated in Flanders, chiefly for the sake of the oil obtained from its seed. The husks, in the form of cake or dust, after the oil is expressed, are a well known manure, which we shall have occasion to notice under the proper head. We shall give some remarks by the late Mr Culley of Northumberland, founded on his own excellent practice, in which rape was substituted for fallow on a poor clayey soil.

Time of sowing, &c.

"Rape may be sown from the 24th of May to the 8th of June, but comes to the greatest growth if sown in May. If sown earlier it is apt to run to seed. From two to three pounds of seed is required per acre, sown by a common turnip-seed drill. But as rape-seed is so much larger than turnip-seed, the drill should be wider. When hoed, the rape should be set out at the same distance as turnip plants. The drills should be from 26 to 28 or 30 inches, according to the quantity of dung given. As many ploughings, harrowings, and rollings, &c. should be given, as may be necessary to make that kind of poor soil as fine as possible, and cleared of twitch, &c.; the produce will be from twenty-five to even fifty tons per acre, or upwards. But it is not so much the value of the green crop (although the better the green crop, the better will the wheat be), as the great certainty of a valuable crop of wheat, that merits attention. The sheep are put on from the beginning to the middle of August: they must have the rape consumed by the middle, or at latest by the end of September, so that the wheat may be got sown on such poor damp soils, before the autumnal rains take place. The number of sheep must depend upon the goodness or badness of the crop. But as many sheep must be employed as to eat the rape by the middle of September, or end of that month at the latest, for the reasons formerly given. The Burwell red wheat (so called from a village in Cambridgeshire) is always preferred. Poor clays will not allow deep ploughing; consequently that operation must be governed by the depth of the soil. The land must be made as clean as any naked fallow. There is scarcely an instance known of a crop of wheat, sown after rape and eat off with sheep, being mildewed; and the grain is generally well perfected. Mr Culley has known a crop of wheat after rape, upon a poor moorish thin clay soil, worth much more than the fee simple of the land that produced it. He has frequently known land, both after rape and after naked fallow, in the same field; and invariably the rape wheat was better in every respect than that after naked fallow." (*Husbandry of Scotland*, vol. ii. appendix, p. 45.)

13. *Cabbages.*

Cabbages.

The culture of cabbage in the fields is not carried on upon a great scale, though very profitable crops have been raised in particular situations. The variety cultivated for cattle is the large field cabbage, known by several names. It prefers a strong loam, which is to be prepared in much the same manner as for potatoes or turnips, the plants being dibbled along the top of each ridgelet any time from March to June, though the earliest crops are usually the best. Plants to be used in March must be got from seed sown in the month of August preceding; but those planted out in May or June may be raised from a sowing in February or March. The after-culture consists in horse and hand hoeing and weeding, the produce being from 35 to 40 tons the acre, which is commonly used in the feeding of milch cows, but sometimes also in fattening sheep and oxen. They are excellent food for ewes that have newly dropt their lambs, as they produce abundance of milk.

14. *Clovers.*

Clovers.

Clovers enter largely into the succession of crops on all soils, and in every productive course of management. Before they were introduced into cultivation, when land was exhausted by grain crops, it was necessary to leave it in a state of comparative sterility for several years before it was either valuable as pasture, or again fit for carrying corn. But at present clovers are not only indispensable in the cultivation of white and green crops *alternately* upon very rich soils, but are the foundation of *convertible* husbandry on land that is not so rich as to permit of constant aration, and which therefore requires two or more years' pasturage at certain intervals. As the succession of crops forms the subject of the following section, in which we shall have occasion to notice the great value of clover as a crop in the alternate and convertible systems of husbandry, we shall here consider it without any particular reference to its general utility in that view.

Red clover, or, as it is sometimes called, broad clover, is the kind most generally cultivated on land that carries white and green crops alternately, as it yields a larger produce for one crop than any of the other sorts. White and yellow clover are seldom sown with it, unless when several years' pasturage is intended. As ryegrass is almost invariably sown with clover, it will be necessary to notice it also in this place.

Sown with corn.

Clover and ryegrass are sown *broad-cast* along with or upon growing culmiferous corn crops of every kind, and are found to prosper almost equally well with spring-sown wheat, barley, and the early varieties of oats. Being most generally sown in spring, they are usually put in immediately after the soil has been pulverized by harrowing in the corn seed, and are themselves covered by one course more of the harrows; or if the corn is drilled, they are sown immediately before or after hand-hoeing, and the land is then finished by a course of the harrows. A lighter harrow is generally employed in covering grass-seeds than that used for corn. When the land is under an autumn-sown crop of wheat or other grain, though the clovers and ryegrass are still sown in spring, the proper period must depend both upon its condition and the progress of the crop; and it may be often advisable to break the crust formed on the surface of tenacious soils, by using the harrow before the clovers are sown, as well as afterwards to cover them. Sometimes the roller only is employed at this time; and there are instances of clover and ryegrass succeeding when sown without either harrowing or rolling. But it is commonly of advantage to the wheat crop itself to use the harrows in spring; and the roller alone cannot be depended on, unless the season be very favourable. In some cases grass-seeds are sown by themselves, either in autumn or spring, but rarely on tillage land, the subject of the present chapter.

Quantity of seed.

The quantity of red clover and ryegrass sown on an acre is exceedingly various, not only according as more or less white or yellow clover is sown along with them, as when pasturage is intended; but even when they are the only kinds sown, the quantity is varied by the quality of the soil, and the different purposes of hay, soiling, or one year's pasture, to which the crop is to be applied. When pasture is the object, more seed ought to be allowed than is necessary when the crop is to be cut green for soiling; and for hay, less may suffice than for either of the former. Finely pulverized soils do not require so much seed as clays on which clover and ryegrass are very frequently sown among autumn or winter-sown wheat, when there is more danger of a part of it perishing from being imperfectly covered. In general, eight or ten pounds may be taken as the *minimum* quantity, though there have been instances of good crops from less; and from that to 14 lbs. or more per English statute acre. Ryegrass, commonly at the rate of a bushel per acre, but in many cases only half or two-thirds of a bushel, is mixed with this weight of clover, and both are sown at the same time. The ryegrass may be either of the perennial or annual variety, as it is understood that the herbage is to be continued for only one year; and the annual is sometimes sown in preference, as producing a bulkier crop than the perennial.

Annual ryegrass.

In the selection of clover and ryegrass seeds, particular attention should be paid to their quality and cleanness. The purple colour of the clover seed denotes that it has been ripe and well saved, and the seeds of weeds may be detected in it by narrow inspection if there be any; but various noxious weeds are frequently mixed up with the seeds of the ryegrass, which it is difficult either to discover or to separate from them. Between the seeds of the annual and perennial ryegrass the difference is hardly discernible; and therefore, unless it is of his own growth, the cultivator must depend in a great measure on the character of the person from whom he purchases it. Red clover from Holland or France has been found to die out in the season immediately after it has been cut or pastured; while the English seed produces plants which stand over the second, many of them the third year (*General Report of Scotland*, vol. i. p. 537), thus remaining in the latter case four summers in the ground from the time of sowing.

Clover and ryegrass, as has been already hinted, are made into hay, cut green for being used in soiling, or depastured. As we shall have occasion to speak again of hay-making, we shall here only notice the principal operations.

Hay.

This sort of herbage ought always to be cut as close to the ground as possible; and the soil, having been previously cleared of any stones that might impede the scythe, and also levelled with a heavy roller, admits of mowing being performed in a very uniform and perfect manner, unless the crop be lodged or broken down by wind. Whatever part of the stems is left by the scythe is not only lost, but the after-growth is neither so vigorous nor so weighty as when the first cutting is taken as low as possible.

Time of cutting.

Clover and ryegrass are commonly all mown in June, though in the north sometimes not till near the end of July. The time of mowing must, indeed, be determined by the growth of the plants; but it is a common error to allow them to stand too long. They should in every case be cut down before the seeds are formed, that their juices may be as much as possible retained in the hay. When the stems become hard and sapless, by being allowed to bring their seeds towards maturity, they are of little more value as provender than an equal quantity of the finer sort of straw of corn.

Hay-making.

One of the best among the various modes of hay-making, at least for clover and ryegrass, may be described in a few words. As soon as the swath is thoroughly dry above, it is gently turned over (not *tedded* or scattered), without breaking it. Sometimes this is done by the hand, or by a small fork; and some farmers are so anxious to prevent the swath from being broken, that they will not permit the use of the rake-shaft. The grass, when turned over in the morning of a dry day, is put into cocks in the afternoon. The mode of performing this is very simple and expeditious; and none but women, boys, and girls, under the eye of a confidential servant, are usually employed. If the crop is heavy, a row of cocks is placed in the middle ridge of three, and if light, of five ridges. A distinct company of *carriers* and *rakers* is allotted to every such number of ridges; and the separate companies proceed each on its own ground, in the same manner as in reaping grain, which occasions a degree of competition among them for dispatch, clean raking, and neat well-built cocks. The *carriers* gather the hay, and carry it to the ridge where the cock is to be built, by one of the most experienced hands. A *raker* follows the *carrier*, taking up and bringing to the cocks the remains of the swath. There may be in general about five people employed about each row of cocks; a carrier and raker on each side of the ridge on which the cocks are placed, and a person on the ridge, who builds them. But when the crop is not weighty, more rakers are required, as a greater space must be gone over.

As the cocks are thus placed in a line, it is easy to put two or more into one afterwards; and the larger cocks may be speedily drawn together, to be put into tramp-ricks, by means of ropes thrown round their bottoms, and dragged along by a horse. It is impossible to lay down any rules for the management of hay after it is put into cocks; one thing is, however, always attended to, not to shake out, scatter, or expose the hay oftener than is really necessary for its preservation. Sometimes the cocks have been put up so large, that they never required to go to a tramp-rick, but were carted to the stack-yard, without ever being broken, and put up in alternate layers with old hay. But where this is attempted, there must not be much clover. The practice of mixing the new with the old hay is, however, a good one, and saves a great deal of time and labour, at the same time that the old hay is much improved by the mixture.

The best managers disapprove of spreading out the swaths of clover and ryegrass, though this is often necessary with natural grasses, which are cut and harvested later in the season. The more the swath is kept unbroken, the hay is the greener and the more fragrant.

Another mode of hay-making, said to have been originally practised in Lancashire, has been found to answer well in the moist atmosphere of the west of Scotland. This is called *tippling* or *rippling*; and, if the grass be dry, the operation begins as soon as it is mown. "In making a tipple, a person, with his right hand, rolls the swath inwards, until he has a little bundle; then the same is done by the left, until both meet, and form 8 to 12 pounds, or nearly so. This bundle is then set up against the legs, or between the feet; a rope is twisted off the grass, while the bundle is supported in this manner, and tied round it, near its top; and from the top are drawn up a few straggling stems, which are twisted, to make the tipple taper to a point, and give it as much a conical shape as possible. If the crop is strong, there is a row of tipples placed on each swath; if light, two of these are put into one row. After standing a few hours, they become so smooth on the outside, that the heaviest rains seldom wet them through; and when wet, they are soon dried again in good weather. As soon as ready, they are put into the summer-rick, or, if very dry, even into the winter-stack, but are never opened out or *tedded* to make them dry, as they never require it. By this method not a blade is lost, and the hay is nearly as green as a leaf dried in a book. In a moderate crop, one woman will tipple to one mower, and a woman will rake to two tipplers or two swathers. But where the crop is strong, it may require three women to keep pace with two mowers. After the hay is put up in this manner, the crop may be considered as secure, though it may continue wet weather for a considerable length of time." (*General Report of Scotland*, vol. ii. p. 11.)

Stacking.

Hay is commonly carried to the stack-yard, and built either in circular or oblong stacks (the latter form being most generally approved of), and carefully thatched, as has been already observed in regard to corn. It is never advisable to allow this kind of hay to become heated in any considerable degree in the stack, though a slight exudation, with a very gentle warmth, is usually perceptible, both in the field ricks and in the stacks, for a few days after they are built; but this is quite a different thing from that intentional heating, carried so far, in many instances, as to terminate in conflagration.

Produce per acre.

The weight of hay from clover and ryegrass varies, according to the soil and the season, from one to three tons per English acre, as it is taken from the tramp-ricks; but after being stacked and kept till spring, the weight is found to be diminished 25 or 30 per cent. Its price per ton depends entirely on situation: at a distance from towns or large villages, in ordinary seasons, the price is usually very low, and the whole of it is generally consumed on the farm that produced it. Its intrinsic value as fodder, in comparison with the straw of beans or peas, may be in the proportion of three to two; and with the finest straw of corn crops, in the proportion of two to one.

Objections to ryegrass.

Many intelligent cultivators consider ryegrass as a very severe crop for the soil; and it is alleged that wheat does not succeed well after the herbage with which it is intermixed in any considerable quantity. Other plants have accordingly been recommended as a substitute for ryegrass, and cocksfoot (*Dactylis glomerata*) has been tried, apparently with great success, by Mr Coke of Holkham, in Norfolk, and others. But this is a very coarse grass when allowed to rise to any height, and the use of it for hay has not yet been fully ascertained.

When the hay crop is cut and removed, there is commonly a vigorous after-growth, which may be either cut or pastured. As this consists almost exclusively of red clover, and is extremely succulent, it is seldom made into hay, owing to the difficulty of getting it thoroughly dried at a late period of summer, when other more urgent operations usually employ all the labourers of a farm. If it be cut for this purpose, the best method of saving it is, to mix it up with straw, which will absorb a part of its juices. It is often cut green, as a part of the soiling system; or, where a sheep stock is kept, pastured by the old ewes, or other sorts, that are to be fattened the ensuing winter on turnips.

Soiling.

On all farms under correct management, a part of this crop is cut green for the working horses, often for milch cows, and in some instances both for growing and fattening cattle. This mode of consuming it is known by the name of *soiling*. There can be no doubt of the advantages of this practice in regard to horses and cows; but for young and for fattening beasts, a sufficient number of experiments are not known to have been yet made with any great degree of accuracy. Young animals require exercise in the open air, and probably will not be found to thrive so well in houses or fold-yards, during summer, as on pastures; and though in every case there is a great saving of food, the long, woody, and comparatively naked stems of the plants, with leaves always more or less withered, are perhaps not so valuable in the production of beef on fattening stock, as a much smaller weight of herbage taken in by pasturing. Milch cows, however, are so impatient of heat and insects, that this way of feeding them, at least for a part of the day, in warm weather, ought to be more generally adopted; and the convenience of having working horses always at hand, besides that they fill their stomachs speedily, is of no less importance than economy.[1]

In feeding cattle with green clover, attention must be paid to prevent swelling or *hoving*, which is very apt to take place when they are first put on this food, especially if it be wet with rain or dew; and cattle are exposed to this danger, whether they are sent to depasture the clover, or have it cut and brought home to them; though, if the plants be somewhat luxuriant, the danger is greater in the former case. After being accustomed to this rich food for a few days, during which it should be given rather sparingly, the danger is much diminished; but it is never safe to allow milch cows, in particular, to eat large quantities of wet clover.

Saving of seed.

We have hitherto spoken of red clover and ryegrass, as cultivated for the sake of the stems and leaves, and shall now add a few words about the management required when the object is to save their seeds. Ryegrass seed is gathered in almost every part of Britain, but clover seed can seldom be saved in any profitable quantity in the northern parts. In Scotland, red clover is never cultivated for seed.

Ryegrass seed.

The common practice in regard to ryegrass is, to let the mixed crop of that and clover stand till the seeds of the former have attained a considerable degree of ripeness, when it is cut down and made into hay in the usual manner; and the seeds of the ryegrass are separated by the use of the flail, commonly before the hay is put into the field-ricks. Sometimes, when but a small quantity is wanted, the hay is merely shaken well upon a cloth, when it is building in the stack-yard; or afterwards, in the stable-loft, before it is put into the horses' racks. But in all of these methods, in order to obtain good seed, the clover must remain uncut beyond the proper season; and it is thus materially injured in quality, while the value of the ryegrass seed, in such a crop, is merely a secondary consideration.

When seed is the principal object of the culture of ryegrass, it ought not to be mixed with clover at all, though it may be sown along with any of the kinds of corn already mentioned; and it is treated the year after in every respect as a crop of corn; bound up in sheaves, built in stacks, threshed with the flail, and dressed by the winnowing-machine, in the same manner.

The difficulty of distinguishing between the annual and perennial varieties of ryegrass has led to the practice, in some places, of cutting or pasturing the first year's crop, and taking a crop for seed in the second year. If the growth of the ryegrass plants be close and vigorous the second year, there is reason to be satisfied that the seed is of the perennial variety; and though red clover has been sown with the ryegrass, a great part of it disappears by that time, and forms but a small portion of the second year's cutting.

Clover seed.

The seed of red clover is saved with more labour and difficulty. As the plant does not perfect its seed early in summer, it is necessary to take off the first growth, either by feeding or cutting. In the first case, it is eaten till about the end of May, frequently by ewes and lambs; and this is understood to be an advantageous practice, because the land is less exhausted, and the green food is of great value for stock in the spring months. It is not uncommon, however, to cut the first growth for a hay crop; and this should be done earlier than usual.

The growth thus reserved for seed must be suffered to remain till the husks become perfectly brown, when it is cut and harvested in the usual manner, leaving it on the field till it is very dry and crisp, that the seeds may become more fully hardened: it may then be laid up dry, to be threshed out at the farmer's convenience.

Much labour and expense are necessary in separating the seed from the capsule or seed-coat, especially when it is effected by threshing, which seldom costs less than from five to six or seven shillings per bushel. By the use of mills the work may be done much cheaper.

The produce in seed may generally be from three to four or five bushels per acre when perfectly clean, weighing from two to three hundredweights. But there is great uncertainty in the produce of clover seed, from the lateness of the season at which it becomes ripe; and the fertility of the soil is considerably impaired by such a crop. Yet the high value of the seed is a great inducement to the saving of it, in favourable situations. (Dickson's *Practical Agriculture*, vol. ii. p. 863.)

Seeds for pasture.

When it is intended to retain the land in pasture for several years, the quantity of red clover is diminished, and several kinds of more permanent herbage are added, the most common of which are, white and yellow clover, and ribwort. No general rule can be laid down as to the proper quantity of each of these kinds; in some cases red and white clover are sown in equal proportions, and in others the latter is made greatly to predominate. The yellow clover and ribwort are not often sown at the rate of more than two or three pounds per acre. It is scarcely necessary to add, that in this case the ryegrass should always be of the perennial sort.

When permanent pasture is the object, a still greater variety of seeds has been recommended. But as cultivators are by no means agreed on this point, and as the different kinds and proportions which are thought best adapted to different soils have none of them the sanction of extensive experience, we shall refer the reader to the third volume of *Communications to the Board of Agriculture*, which is wholly occupied with essays on the best means of breaking up old grass-lands, and restoring them after a few years to permanent pasture.

15. *Lucerne.*

Lucerne.

This is a deep-rooting perennial plant, that sends up numerous tall clover-like shoots, which bear blue or violet-coloured flowers. It is much cultivated in the south of Europe, and has also been found to answer in some parts of England, though the principal seat of its culture is Kent. The Roman writers *De Re Rustica* extol this plant beyond all reasonable bounds, and are very minute in their directions about its cultivation. Lucerne requires a very deep, friable soil, inclining to sand, with a subsoil of a similar character. It is sown, either in drills or broad-cast, in March or early in April, and sometimes along with barley; the quantity of seed being from 15 to 20 pounds if sown in the latter way, and from 8 to 12 if in the former. It must always be kept free from weeds, and should be top-dressed with dung or other manure at least every five or six years. Some prefer giving it a slight dressing every spring. It is consumed in much the same way as clover, either in a green state, or after being made into hay. In some very favourable situations it admits of being cut five times in the course of the summer. It is an excellent food in its green state, both for horses and milch cows; and if it be equal in the quantity of its produce to a full crop of red clover, and continue in a productive state for nine or ten years with only the expense of occasional top-dressings, it would appear to be entitled to a preference on all suitable soils and situations. The failure of clover on lands where it has been long or too frequently grown, a fact which seems to be generally admitted, may induce our farmers to make trials of lucerne in places where it is yet very little known; and it may possibly in time become so inured to our climate as to answer in parts of the island where it is now thought unlikely to succeed. Though it can never come into our rotations like red clover, on lands kept under an alternate course of corn and green crops, not attaining its most productive state in a single year, yet it may be introduced upon those soils which require to be kept from the plough, and in pasture for several years, before they are restored to tillage.

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[1] See *Communications to the Board of Agriculture*, vol. vii.; Brown's *Treatise on Rural Affairs*, vol. ii.; *General Report of Scotland*, vol. ii. and iii.

16. *Saintfoin.*

Saintfoin. This is also a deep-rooting perennial plant, suited to dry, warm, chalky soils. It is sown in February or March, at the rate of about four bushels to the acre, sometimes along with barley or other kinds of grain; is ready for being mown the second year, and may last from seven to ten years, though in its greatest perfection in about three years. The produce in hay is from 1½ ton to 2 tons per acre. It is mown for soiling or hay, or pastured in the same way as clover. If the crop is chiefly taken off by mowing, it must be occasionally top-dressed with manure or peat ashes.

17. *Flax and Hemp.*

Flax. The soil most proper for flax is one that is deep, friable, and rather moist. It often succeeds well in lands taken up from grass, or after only one crop of corn. In Ireland it is usually sown by the small farmers after potatoes. The land must be well pulverized before the seed is sown, cleared of stones or roots, and rolled after the seed is put in. The usual time of sowing is from the middle of March to the end of April. Dutch seed is in the highest estimation, affording a greater produce than the American seed, and a finer quality than the Riga. The after-culture consists in taking up the weeds as they rise,—a very tedious process if the land be at all foul, as it can only be done by the hand,—and in some cases in the further use of the roller. The crop is raised by pulling up the plants by the root: immediately after, they are put into a pool to be steeped or watered; and, when taken out of the pool, spread out upon grass-land to dry and bleach. The time allowed for steeping and bleaching varies with the condition of the plant and the state of the weather, but need seldom exceed 10 or 12 days for each. But both these processes may be dispensed with by the use of Hill and Bundy's patent machines, by which the entire preparation may be completed in six days. The produce in seed, when that is the object, is from 6 to 8, and sometimes as high as 10 or 12 bushels per acre. The best of it is kept for sowing again, the next quality is crushed for oil, and the inferior is boiled or steamed for cattle. The cake itself, or the residuum after the oil has been expressed from the seed, is alone a valuable article in the fattening of live stock and in the rearing of calves. The produce of flax in fibre may vary from 3 cwts. to half a ton the acre.

Hemp. Hemp requires a deep, black, vegetable soil, somewhat inclined to moisture; and the preparation and season for sowing, and the after-culture and management, are all nearly the same as for flax. But the male plants are usually taken up four or five weeks before the female, so as to give the latter time to ripen their seeds.

Flax and hemp, when allowed to ripen their seeds, are considered exhausting crops, even more so than corn; and, in most parts of Britain, are so uncertain in their produce, that their cultivation has hitherto been very limited. But a great deal of flax is raised in Ireland.

18. *Hops.*

Hops. The hop has been long cultivated extensively in several parts of England, and would probably answer in the south of Ireland; but it is not adapted to the climate of Scotland. In the most favourable situations it is a most precarious crop, sometimes yielding large profits, and at others scarcely defraying the expenses of management. The soils most favourable to the growth of hops are clays and strong deep loams, with a dry, friable subsoil.

Planting. "When it is intended to make a new plantation, the best method is to have cuttings from approved stock planted out the year before they are wanted in the hop-ground, as the use of plants instead of cuttings not only gains a year, but they are more certain to flourish, as many of the cuttings will not take root in a dry season, unless they are watered, which is seldom resorted to. A small piece of moist land is sufficient to raise plants for many acres, and at little expense. If the ground be in grass, some would pare and burn the surface, and take a crop of grain, which is not so advisable as paring and digging in the sods. The land is worked with a spade, and set out into ridges of 3½ yards wide, and two yards between each, having a strip of grass (called a pillar) next every ridge, and an open drain between every two pillars, the depth of which must vary according to the soil, some being less than one foot, and others nearly four feet in depth. Three rows of plants, or, as they are termed, hills, are made upon each ridge, which should intersect each other. They are generally nearly two yards distant in the rows, so that about 1300 are the usual number of hills in a statute acre; but as some grounds, where only two poles are set at each hill, are in narrower ridges, the number of hills is consequently greater. Small sticks are proper to tie the bines up to the first year, then small poles for a year or two, the size of which should be gradually increased. Some set two poles to every hill, which is proper for ground producing luxuriant bines; but on clay land, three poles are set in a triangular form to the hills on the two outside rows of each ridge, and only two in the middle row. Many additional poles, longer than the rest, called catch-poles, are also set to take the bines as they run beyond the lesser poles. Where the bine is weak, three heads are commonly trained up each pole; though two are better, if strong. Their course round the pole is the contrary to that of the kidney-bean. If the ground intended for a new plantation is not clean from couchgrass, a complete fallow is essential, whether it is grass or stubble; and a crop of turnips may be taken to advantage if the land is proper for their growth, and can be made clean, as hops are planted in March.

Expense.

"The expense of taking up hop-ground is from five to six pounds per acre, as the price of planting varies with the mode pursued; and if the drains are required to be deep, or the soil is particularly strong, a still greater sum will be expended; to which may be added L.25 per acre for poles, before the ground has its full quantity; and also the rent, taxes, &c. and the working for three years, before many hops can be expected. A substantial building for an oast or kiln cannot be erected for L.100, if it has store-rooms necessary for only five acres. The following are termed the annual orders:—Digging the ground completely over, hoeing the earth from the hills, and cutting off the stock a little above the root, which are called pickling and cutting; poling, which is carrying the poles from the stacks, and setting them down to the hills with a round implement shod with iron, and called a poy, having a crutch at the top, and a peg through the middle to tread upon; tying the bines round the poles with rushes, and pulling up the superfluous bines; hoeing the ground all over with a hoe of large dimensions; wheeling and laying manure upon every hill; covering the manure with the soil, which is done by scraping the ground over with a hoe, and is called hilling; and stacking, which is carrying and setting up the poles into heaps or stacks, after the crop has been taken. The annual expense of these orders varies from L.2. 15s. to L.3. 5s. per acre.

Manure.

"As to the manure most proper for the hop-culture, good stable dung is much used, and is preferred to the manure made by cattle, as the latter encourages ants on strong ground. Woollen rags are the best for forcing a luxuriant bine, and, if used with judgment, are excellent for clay ground; but they are apt to make the hops small, if too many are used. Malt culm and dove manure are excellent; and one complete dressing with lime is very serviceable for strong ground.

Taking the crop.

"When the crop is ripe, a proper number of pickers are procured, for whom are provided light wooden frames, called binges: they are clothed with hop-bagging, into which the hops are picked off the poles by women and children, having them brought by men, who take them up by cutting the bines about a foot above the ground, and drawing up the poles by an instrument called a dragon. Each binge has from four to six pickers, and a man attends to one or two binges, according to the crop; he strips the bines from the poles as they are picked, and lays them in heaps ready for stacking; he also carries the hops to the kilns, if near, or to a cart as they are measured from the binge. It is necessary to have a supply of cokes in the kilns to dry the hops, which are spread on a hair-cloth which is upon an upper open floor of wood, above the fire or fires, every noon and midnight, whilst the picking continues. They are stirred repeatedly, and, when cured, are turned off into the store-room, to be put into bags and pockets (after they have been there about a week), which is done by fixing each bag (being first legally marked with the grower's name, &c.) in a frame, and treading the hops in. The excise-officer, who attends during the season, then weighs them, and charges 2d. per pound for the duty, when they become marketable.

Annual expense.

"From the foregoing particulars, it will appear that there is scarcely any hop ground but costs yearly upwards of L.12 per acre (exclusive of the picking and duty, which may exceed L.20 per acre, or be very little); and there are other grounds in which upwards of L.20 per acre are annually expended; so the average may be said to be about L.15 per acre, without the picking, drying, and duty.

Produce.

"If a good plantation produces 10 cwt. per acre in a crop year, which are sold at L.5 per cwt., the annual expenses being L.20, and the picking, &c. and duty L.20, the profit will be L.10; and admitting that the same ground pays all expenses in a blight year, and supposing that to be every third year, the profits would be nearly L.7 per acre annually; but, as the foregoing crop cannot be expected on any ground every other year, the produce of the third year may be stated at 5 cwt. per acre, at 8 guineas per cwt., deducting the annual expenses, L.20, and the picking and duty, L.12.

Hops exposed to great risk from season and insects.

"This plant is extremely liable to disasters, from its first putting up in the spring, until the time of picking the crop, which is in September. Snails or slugs, ants and fleas, are formidable enemies in the first instance. Frosts are inimical to its growth; and the bines are frequently blighted, even after they have reached the top of the poles. Small green flies, and other insects, which make their appearance in the months of May and June, when the wind is about north-east, often greatly injure them; and they are subject to take damage by high winds from the south-west. The best situation for a plantation, therefore, is a southern aspect, well shaded on three sides, either by hills or planting, which is supposed to be the chief protection that can be given them." We have taken these observations on hops from an able communication by Mr Parkinson, himself a hop-grower, given in the *Farmer's Magazine*, vol. xvi.

On a suitable soil, a hop plantation may continue for fifteen years or more, but commonly begins to fall off about the tenth year. The expense of forming one has been estimated in all at from L.70 to L.100 per acre. One objection to the cultivation of hops is, that they require a great deal of dung, which in most cases can only be procured by abstracting it from the tillage-lands. On the other hand, it is admitted, that upon suitable soils, and under good management, they make a very profitable return.

19. *Crops occasionally cultivated.*

Crops occasionally cultivated.

Under this head we may notice a few plants, which, though of some local importance, cannot be considered as forming an object to agriculturists generally.

Fuller's thistle.

1. The *Fuller's Thistle* or *Teazle*, the heads of which are used for raising the nap on woollen cloths. It is grown in Essex and the west of England.

Woad.

2. *Woad.* This is now chiefly cultivated in Lincolnshire. It is used in dyeing, as a basis for black and other colours.

Weld.

3. *Weld* or *Dyer's Weed* is cultivated in some parts of England, chiefly in Essex, and used for giving a yellow colour to cotton, &c.

Spurry.

4. *Spurry* (*spergula arvensis*), which is a diminutive annual weed, that grows on dry, sandy corn lands in most parts of Europe. In Germany and the Netherlands it is sown on corn stubbles, and fed off with sheep; and is said to enrich the milk of cows, and improve the quality of mutton. Some writers have recommended its cultivation in England, where it probably would not pay the expense of seed and labour.

Fiorin.

5. *Fiorin.* This plant has been strongly recommended, within these few years, by the late Dr Richardson of Ireland, as suitable, not for meadows or hay ground only, but also for arable land; and for this reason it is noticed here. In consequence of that gentleman's writings, trials were made of it upon a variety of soils in different parts of Scotland, particularly and upon a large scale at Dalswinton in Dumfries-shire; and the result seems to be, that though a heavy crop of it may certainly be procured on mossy or peaty soils, yet that upon all other descriptions of land it is not by any means so valuable as the crops already in

use. It does not admit of being pastured, affords only one cutting in the year, requires to be top-dressed with ashes or other manure; and after all, upon moderately dry soils, the produce is of very little value. We have seen a crop of it upon rather dry land, under the management prescribed by the doctor himself, which would scarcely pay the expense of cutting and carrying to the farm-yard. Still we think it deserves the notice of those who possess moss lands, as there can be no doubt of its having yielded a large produce under the doctor's own management, and we believe also on a similar soil at Dalswinton. It is certainly relished by horses and other live stock.

Buck wheat.

6. *Buck Wheat.* In this country buck wheat is chiefly cultivated for feeding poultry, pigeons, and hogs; though it is also used in the distilleries, and occasionally the meal is made into thin cakes for bread. It will grow on almost any soil, and may produce on an average from 3 to 4 quarters the acre. The season of sowing is the last week of April, or first week of May. When allowed to stand for a crop, there is nothing worthy of particular notice in its after-culture or management; but some think it of most value when ploughed down green, as a preparation for other crops.

Maize.

7. *Maize* or *Indian Corn* is now under trial in this country by Mr William Cobbett, who is very sanguine of success. It has been hitherto considered as a crop quite unsuited to the climate of Britain.

Kelp.

8. *Kelp.* The plants from which this substance is made can hardly be said to belong to agriculture, yet it is nevertheless of too much importance in many parts of Scotland and Ireland to be passed over without notice. It is made from different varieties of the *fuci*, among which the *fucus vesiculosus* is considered the most productive. The plants which grow on the sea-coast are cut in the summer months, and dried and burned in a rude sort of kiln on the spot. It is of great importance to preserve them from the rain when they have been laid out to dry. The plants may be cut when two or three years old. There are immense tracts on the coast of the mainland and islands of Scotland, where it is thought kelp might be produced merely by putting down stones upon the vacant spaces. During the late war, the best sorts of kelp sometimes sold for L.20 per ton, and the land-owners derived a very considerable profit from its manufacture; but since the peace, barilla having come again into our market at a reduced price, that of kelp has fallen so low as to yield little or no profit, after defraying the necessary expenses. The principal consumption of kelp is in the manufacture of glass and soap. The barilla plant itself, it is believed, might be tried in this country, with a reasonable prospect of success. It has been introduced into France, where the produce was found to be as good in quality as that procured from Alicant. But the most important step, perhaps, would be to improve the manufacture of our own kelp; a point to which the Highland Society of Scotland has very properly given much of its attention of late, and in whose publications a great deal of useful information will be found upon the subject.

Kelp-making.

The following account of the manufacture in the island of Harris, one of the western isles of Scotland, is from the 6th volume of the *Prize Essays and Transactions* of that Society, published in 1824.

"1. The quantity of kelp manufactured on the farm of Strond this season was 115 tons.

"2. All the kelp was made from cut-ware of two years' growth.

"3. The plants used were, *fucus nodosus*, or lady-ware; *fucus vesiculosus*, or bell-ware; and *fucus serratus*, or black-ware.

"It may not be superfluous to remark, that all the kelp made of cut-ware is from these different plants, and that they are always mixed together, as the different varieties grow on kelp-shores generally, and in the following order:—The *fucus nodosus* grows on that part of the shore between high-water spring-tides and high-water neap-tides; and mucous bell-ware, named *gruepach* by the manufacturers, is interspersed with it. As these kinds of ware are but seldom covered by the sea, they are short, and only a little of them can be obtained. The *fucus vesiculosus*, or bell-ware, grows on that part of the shore between high-water neap-tides and low-water neap-tides. From the circumstance of this ware being alternately covered by the sea and exposed to the air for nearly the same space of time, it grows stronger than any of the other varieties; is consequently more plentiful, and most productive. That part of it which grows near low-water-mark neap-tides is of a thinner texture, and is called floating-ware, or *gleurach*. The *fucus serratus*, or black-ware, grows between low-water neap-tides and low-water spring-tides; this variety of ware is plentiful on such shores as are flat, and which only ebb with spring-tides. Black-ware makes good kelp, but is not so productive, from its thin texture.

"Different varieties of tangle-ware appear lower down than the black-ware at low-water spring-tides, but are not cut for kelp-making in those parts, and are only used when drifted ashore for making *cast-ware kelp*.

"4. The specimens of Strond kelp now sent to the Society were taken without any pains of selection, from about 60 tons of the kelp; each specimen sent being taken from different kelp-kilns, containing from 2 to 2½ tons of kelp each. All the kelp made on the farm was equal in quality to the specimens sent, with the exception of about 6 tons, which were made in a bay into which there is a run of fresh water, and where the ware is only covered with salt water with spring-tides. Kelp made of such ware contains less of the alkaline salts than when it is made from that which grows on strong tide-ways.

"5. The kelp from which the specimens were taken was sold by Messrs Macdonald and Ravenscroft, agents, Liverpool, for L.10. 5s.

"6. The process of manufacturing this kelp is as follows, and though similar, may be found to differ in some respects from the general mode of kelp-making. Wherein I consider this difference lies I will point out, by underscoring that part of the description of the process.

"1. The ware is cut off the rocks with a common hook, similar to that used for shearing (reaping), but stronger, and having a rougher edge.

"2. *Care is taken* to land the ware on clean spreading ground; and if any sand or mud is found to stick to the ware, *it is always washed* before landing it.

"3. The ware is spread out every dry day, and made into small cocks at night. When in this way it is found to be pretty dry, *it is made into larger cocks*, and left to heat in them for *six or eight* days; but if the ware is of that description which I have mentioned above as growing in bays into which there is a run of water, *such ware is always left in large cocks for* 15 *or* 20 *days*.

"4. *The ware being thus secured*, a dry day with a good breeze of wind is watched for, in order to burn it.

"5. The kelp-kilns are constructed of middle-sized stones, of hard texture, and built up carelessly; the outsides of the kilns are covered with turf; the length of each kiln is from 15 to 18 feet, breadth 2½ feet, height 2 feet. They are made on the surface of the ground, and on the firmest sward they can find.

"6. The process of burning is as follows:—A small bundle of straw or heather is set on fire; the dryest part of the ware is placed over this, and gradually added, until the flames become general through the kiln; then the ware to be burnt is thrown in, little by little, till the whole is reduced to ashes. If, however, it happens that the day is too calm, or that the ware is not sufficiently dry, so that the ashes cool and cake into white crusts, *the manufacturer stops burning any more, until he rakes all the ashes in the kiln;* then commences burning again, and goes on in this way until he has the whole thoroughly burnt. Want of attention to this method leaves kelp of a white colour and porous texture.

"7. The last process is the raking or working of the ashes with an iron with a wooden handle, made for the purpose, until the whole is brought into a solid semi-vitrified state. Most manufacturers commence this process immediately after the last part of the ware is put into the kiln, and when a good deal of the ware is not sufficiently burnt, and of a black colour. The Strond manufacturers, however, do not *commence raking* the *ashes* for at least half an hour after the last of the ware is put on, so that the whole may be thoroughly burnt. Want of attention to this particular leaves kelp of an ugly black colour.

"The raking of the ashes is simply done by working the kelp-irons through it until the whole becomes a semi-vitrified mass. *Three* or *four* men are employed at this process; if fewer, the ashes will not be sufficiently worked, and consequently a great part of them must be mixed in the next burning.

"*Finally*, The kelp is broken into pieces of about 2 cwt.; these are made into conical heaps, covered with dry ware, and over that is placed a layer of turf, which secures the kelp tolerably well, if early shipped."

Sea-grass.

9. Sea-grass (*zostera marina*) is a plant which abounds in the Orkney Islands, and has lately come into use for stuffing chairs, mattresses, and other sorts of furniture in which horse-hair was formerly used. When properly prepared, it is found to be elastic and durable, and is not subject to the attacks of those insects which often infest mattresses made of wool or cotton.

The following account of this plant is taken from the *Prize Essays and Transactions of the Highland Society*, vol. vi. and was written in 1823.

"The zostera generally grows at such depths as to be left nearly dry by the ebbing of spring-tides.

"The leaves remain attached to the stem until the month of September, and during the autumn and beginning of winter are thrown ashore in large quantities.

"As this plant floats near the surface of the water, it is always driven *before* the wind; unlike the other marine plants of these islands, which (with the exception of *fucus vesiculosus*, whose air-vessels keep it afloat) remain near the bottom, and are forced ashore, *against* the wind, by the ground-swell or reflux of the waves.

"The sea-grass is used by the inhabitants of these islands as manure for their fields, for which purpose it is either gathered into heaps with other marine plants, and allowed to ferment before being applied to the land, or formed into compost with earth, litter, &c.; in both of which ways it is found to answer well.

"It is also used by the poorer classes of labourers or cottars as thatch for their houses, and in this way forms a good defence against the violent winds and heavy rains of their rude climate, for two years.

A substitute for horse-hair in mattresses.

"Its application as a substitute for horse-hair, in stuffing mattresses and furniture, was unknown in these islands until the attention of a few individuals was devoted to it by the offer of a premium by the Highland Society of Scotland, for its preservation for that purpose, and with a view to its introduction as a useful article of manufacture.

"The list of premiums offered by the society happening to come into the hands of the writer of this brief and imperfect sketch during last autumn, he conceived he might employ some of his people profitably in collecting, washing, and drying the grass for sale. The season being unluckily too far advanced for procuring any large quantity, he prepared, by way of experiment, 1 ton 3 cwts. 14 lbs. which his agent has since sold to the manager of the Asylum for the Industrious Blind at Edinburgh, at the rate of 12s. 9d. per cwt. On this quantity, which grossed L.14. 15s. his net profit did not exceed L.8; but this partly arose from inexperience in the mode of preparing it. On a quantity amounting to nearly three tons, which he has got ready for market within these few weeks, the expenses of washing, drying, and picking, have not amounted to more than half of the charge on the smaller quantity first noticed. The first was carefully washed twice in vessels filled with fresh water, and dried quickly, and then any sea-weed that had floated ashore with it picked out when dry. The last was carted to a fresh-water lake, and steeped during a week, when it was taken out, and picked by boys and young girls while spread wet upon the ground. If properly steeped, exposure to drought for one day will make it sufficiently dry for packing. When dry, care must be taken, if the weather is windy, to gather it into heaps or cocks, otherwise it may be blown away, being then extremely light. The first quantity prepared was sent to market in large bags of sacking, of the size of wool-packages, very hard packed; yet that small quantity required 14 bags to contain it. The last has been twisted into ropes, of the thickness of a man's waist, and then compactly made up in nets formed of ropes made of bent-grass.

"The zostera is a plant of a very imperishable nature, and may be kept for any length of time in fresh or salt water, without any apparent decay. Should a sufficient demand arise for this grass, at a fair price, any quantity could be collected in the Orkney Islands that the market could require; and it would furnish a species of labour well adapted to old people past hard work, and young people not yet able for hard work. The wages generally given for such sort of work at present is 6d. per day, which is more than can be earned by plaiting straw, the staple employment of young people in the Orkney Islands."

SECT. VII. SUCCESSION OF CROPS.

Succession of crops.

There is no branch of husbandry that requires more judgment, nor any on which the profits of the farmer more depend, than the order in which the several crops cultivated are made to succeed one another. The general rule is, that culmiferous crops, ripening their seeds, should not be repeated, without the intervention of pulse, roots, herbage, or fallow. This rule is recognised in the prac-

First general rule.

tice and writings of all judicious cultivators, more generally, perhaps, than any other in the whole compass of the art of agriculture.

Alternate system.

With regard to the particular plants that enter into the course of cropping, these, it is evident, must be such as are suited to the soil and climate, though they will be somewhat varied by local circumstances, such as the proximity of towns and villages, where there is a greater demand for turnips, potatoes, hay, &c. than in thinly peopled districts. In general, beans, and clover with ryegrass, are interposed between corn crops on clayey soils, and turnips, potatoes, and clover and ryegrass, on dry loams and sands, or what are technically known by the name of turnip soils. A variety of other plants, such as peas, tares, cabbages, and carrots, occupy a part, though commonly but a small part, of that division of a farm which is allotted to green crops. This order of succession is called the system of *alternate husbandry;* and on rich soils, or such as have access to abundance of putrescent manure, it is certainly the most productive of all, both in food for man and for the inferior animals. One half of a farm is, in this course, always under some of the different species of *Cereal gramina*, and the other half under pulse, roots, cultivated herbage, or plain fallow.

Convertible system.

But the greater part of the arable land of Britain cannot be maintained in a fertile state under this management; and sandy soils, even though highly manured, soon become too incohesive under a course of constant tillage. It therefore becomes necessary to leave that division, or *break*, that carries cultivated herbage, to be pastured for two years or more, according to the degree of its consistency and fertility; and all the fields of a farm are treated thus in their turn, if they require it. This is called the system of *convertible husbandry;* a regular change being constantly going on from aration to pasturage, and *vice versa*.

Second general rule.

Another rule with regard to the succession of crops, is not to repeat the same kind of crop at too short intervals. Whatever may be the cause,—whether it is to be sought for in the nature of the soil, or of the plants themselves, experience clearly proves the advantages of introducing a diversity of species into every course of cropping. When land is pastured several years before it is brought again under the plough, there may be less need for adhering steadily to this rule; but the degeneracy of wheat and other corn crops recurring upon the same land every second year for a long period, has been very generally acknowledged. It is the same with what are called green crops; beans and peas, potatoes, turnips, and in an especial manner red clover, become all of them much less productive, and much more liable to disease, when they come into the course, upon the same land, every second, third, or fourth year. But what the interval ought to be has not yet been determined, and (from the great number of years that experiments must be continued to give any certain result) probably cannot be determined, until the component parts of soils, and particularly the sort of vegetable nourishment which each species of plants extracts from the soil, have been more fully investigated.

Third general rule.

A change of the *variety*, as well as of the *species*, and even of the plants of the same variety, is found to be attended with advantage; and in the latter case, or a change of seed, the species and variety being the same, the practice is almost universal. It is well known, that of two parcels of wheat, for instance, as much alike in quality as possible, the one, which had grown on a soil differing much from that on which it is to be sown, will yield a better produce than the other that grew in the same, or a similar soil and climate. The farmers of Scotland, accordingly, find that wheat from the south, even though it be not, as it usually is, better than their own, is a very advantageous change; and oats and other grain, brought from a clayey to a sandy soil, other things being equal, are more productive than such as grew on the sandy soil.

With these general remarks we proceed to mention the most approved rotations on the two general classes of soil, namely, what are called heavy and light, or clay and turnip soils.

1. *Rotations on Clay Soils.*

Rotations on clay soils.

We have already endeavoured to establish the necessity of a naked or summer fallow on land of this description; and beginning with this as the commencement of the course, one of the most approved rotations is,—

1. Fallow with manure;
2. Wheat with seeds;
3. Red clover with ryegrass;
4. Oats;
5. Beans drilled and horse-hoed;
6. Wheat.

In this course, manure should be applied either to the clover stubble before it is broken up for oats, or before the beans are sown.

This rotation has been found to answer on clayey soils generally, but upon those of a superior quality it may be extended to eight years. In that case the order of the crops is,—

1. Fallow;
2. Wheat;
3. Beans;
4. Barley;
5. Red clover and ryegrass;
6. Oats;
7. Beans; and
8. Wheat.

Upon soils of an inferior description, or thin clays, a four years course is,—

1. Fallow with manure;
2. Wheat;
3. Red clover and ryegrass;
4. Oats;

and it is considered an improvement on this course to let the clover and ryegrass division stand to be pastured for two or three years. In that case the ryegrass should be of the perennial description; and white clover must be added to the red in an equal or greater proportion.

In particular situations, where the soil is either very rich or can be abundantly supplied with manure, it has been found profitable to cultivate wheat and beans, and wheat and potatoes, for several years in succession.

2. *Turnip Soils.*

On turnip soils.

On the best description of such soils as do not require a naked fallow, but which admit of turnips being grown and consumed upon the ground, a favourite rotation is,—

1. Turnips, of which at least two-thirds should be eaten by sheep where they grow;
2. Spring wheat or barley, sown from time to time as the turnips are cleared away;
3. Clover and ryegrass;
4. Wheat.

On land of a medium quality, and without an extra-supply of manure, this has been found a very exhausting course, and ought not to be persisted in. Instead of taking two crops of wheat in the four years, it is better to take only one of wheat and one of barley; and the greater part of the clover and ryegrass should, as indeed is usually the case, be pastured the first year, instead of being cut for hay.

By much the greater proportion of turnip soils, however, do not admit even of this modified course, but require, after being sown with grass-seeds, to be retained in pasture for two or more years. The most common period we believe is three years, but upon sandy soils it is better to continue the land in pasturage for five or six years; and on land of this description wheat should not be attempted at all. The rotation would then be,—

1. Turnips, to be nearly all consumed on the ground;

2. Barley;

3. Red and white clover, with perennial ryegrass, to which is sometimes added ribwort (*plantago lanceolata*) and other seeds suited to such soils; the land to be continued in pasture for at least three years, and broken up with,

4. Oats or rye; the latter will often be found the more profitable.

The general rule in all these cases is, that culmiferous crops ripening their seeds must never follow one another without the intervention of a fallow, or a cleansing and ameliorating crop.

Though these be the rotations most generally approved by our best farmers, yet deviations from them may be permitted in particular cases without injury either to the soil or the cultivator. In the neighbourhood of large towns, and in other situations where an abundant supply of manure can be obtained, the crops are not only varied in the order of succession, but others may be substituted for some of those before mentioned. Thus, potatoes near large towns are often found more profitable than turnip, as they serve to prepare the land for wheat, which is almost always the next crop. And it is to be understood that peas, potatoes, cabbages, rape, and other green crops, are not to be considered as excluded from the general rotations; on the contrary, it is usual to sow a small proportion of peas along with the beans, and to allot part of the division under turnips for potatoes, rape, &c.; but those we have mentioned occupy the greater part of each division.

SECT. VIII. MANURES.

Manures.

Under this head we shall notice the several substances most extensively employed, with their management and application, without going into detail as to the various articles of this kind that are to be procured only in small quantities, or in particular situations, and which are therefore used on a very limited scale.

1. *Farm-yard Dung.*

Farm-yard dung.

This manure, composed chiefly of the straw of grain, and the excrementitious substances of live stock, is the principal, and in most instances the only fertilizer of the soil to which farmers have access. Its use is so universal and so well known, that a very few observations will suffice.

As straw is the basis of this compost, every judicious farmer takes care to have his crops cut as low as possible, as it is evident to every one that a few inches of straw towards the root-end adds much to the weight of the crop. From every ton of dry straw about three tons of farm-yard dung may be obtained, if the after-management be properly conducted; and as the weight of straw per acre runs from 1 ton to 1½, about 4 tons of dung, on an average of the different crops, may be produced from the straw of every acre under corn. (*Husbandry of Scotland*, vol. ii.)

The straw is served out to cattle and horses in the houses and fold-yards, either as provender or litter, commonly for both purposes; and turnips in winter, and green clover in summer, on which food the animals pass a great deal of urine, afford the means of converting the straw into a richer manure than if it were all eaten by itself.

All the dung from the houses, as they are cleaned out, ought to be regularly spread over the yards, in which young cattle are left loose, where litter is usually allowed in great abundance; or over the dunghill itself, if there be one at hand. This renders the quality of the whole mass more uniform; and the horse-dung, which is of a hot nature, promotes the decomposition of the woody fibres of the straw.

Management.

At a convenient season, usually during the frosts of winter, this mass of materials is carted out to the field to which it is to be applied, and neatly built in dunghills of a square form, three or four feet high, and of such a length and breadth as circumstances may require. What is laid up in this manner early in winter is commonly sufficiently prepared for turnips in June; but if it be not carried from the straw-yards till spring, it is necessary to turn it once or oftener, for the purpose of accelerating the decomposition of the strawy part of the mass. When dung is applied to fallows in July or August, preparatory to autumn-sown wheat, a much less degree of putrefaction will suffice than for turnips—a clay soil, on which alone fallows should ever be resorted to, not requiring dung so much rotted as a finely pulverized turnip soil; and besides, as the wheat does not need all the benefit of the dung for some time, the woody fibre is gradually broken down in the course of the winter, and the nourishment of the plants continued till spring or later, when its effects are most beneficial.

Application.

In the application of dung to land under tillage, particular attention should be paid to the cleanness of the soil, and to use it at the time when, from the pulverization of the ground, it may be most intimately mixed with it. The most common time of manuring with farm-yard dung is, therefore, either towards the conclusion of the fallowing operations, or immediately before the sowing of fallow crops. If no dung can be procured but what is made from the produce of the farm, it will seldom be possible to allow more than ten or twelve tons to every acre, when the land is managed under a regular course of white and green crops; and it is thought more advantageous to repeat this dose at short intervals, than to give a larger quantity at once, and at a more distant period in proportion. (*General Report of Scotland*, vol. ii. p. 517.)

Farm-yard dung, it is well known, is greatly reduced in value by being exposed to the atmosphere in small heaps previous to being spread, and still more after being spread. Its rich juices are exhaled by the sun, or washed away by the rains, and the residuum is comparatively worthless. This is in an especial manner the case with long fresh dung, the far greater part of which consists of wet straw in an entire state. All careful farmers, accordingly, spread and cover in their dung with the plough as soon as possible after it is brought on the land.

Fresh dung.

It has been urged by a celebrated chemist, that farm-yard dung ought not to be allowed to ferment in any considerable degree, as during a violent fermentation a large quantity not only of fluid but likewise of gaseous matter is lost, which, if retained by the moisture in the soil, would be capable of becoming a useful nourishment to plants. He therefore recommends that it should be applied after a slight incipient fermentation, which he admits to be useful in bringing on a disposition in the woody fibre to decay and dissolve; and this is always, he adds, in great excess in the refuse of a farm. (Davy's *Agricultural Chemistry*, p. 302. 8vo.)

From a recent publication (*Husbandry of Scotland*, vol. i. p. 174), the practice of the best farmers of turnip soils in Scotland appears to be decidedly adverse to the use of fresh dung; and its inutility, or rather injurious effects, from its opening the soil too much, is a matter of experience with every one who cultivates drilled turnips on a large scale. As the whole farm-yard dung on such land is applied to the turnip crop, it must necessarily happen that it should be laid on in different stages of putrefaction; and what is made very late in spring, often after a very slight fermentation, or none at all. The experience of the effects of recent dung is accordingly very general, and the result in almost every case is, that the growth of the young plants is slow,—that they remain long in a feeble and doubtful state,—and that they seldom, in ordinary seasons, become a full crop, even though twice the quantity that is given of short *muck* has been allowed.

On the other hand, when the manure is considerably decomposed, the effects are immediate, the plants rise vigorously, and soon put forth their *rough* leaf, after which the beetle or fly does not seize on them; and in a few weeks the leaves become so large, that the plants probably draw the greater part of their nourishment from the atmosphere. Though it were true, therefore, that more nutritive matter were given out by a certain quantity of dung applied in a recent state, and allowed to decompose gradually in the soil, than if applied after undergoing fermentation and putrefaction, the objection arising from the slowness of its operation would, in many instances, be an insuperable one with farmers.

But there seems reason to doubt whether fresh strawy manure would ferment much in the soil, after being spread out in so small a quantity as has been already mentioned; and also, whether in the warm dry weather of summer, the shallow covering of earth given by the plough would not permit the gaseous matters to escape to a much greater amount than if fermentation had been completed in a well-built covered dunghill.

Another great objection to the use of fresh farm-yard dung is, that the seeds and roots of those plants with which it commonly abounds spring up luxuriantly on the land; and this evil nothing but a considerable degree of fermentation can obviate. The mass of materials consists of the straw of various crops, some of the grains of which, after all the care that can be taken, will adhere to the straw,—of the dung of different animals, voided, as is often the case with horses fed on oats, with the grain in an entire state,—and of the roots, stems, and seeds of the weeds that had grown among the straw, clover, and hay, and such as had been brought to the houses and fold-yards with the turnips and other roots given to live stock.

No rule of universal application can be laid down on this subject; the degree of decomposition to which farm-yard dung should arrive before it can be deemed a profitable manure, must depend on the texture of the soil, the nature of the plants, and the time of its application. In general, clayey soils, more tenacious of moisture, and more benefited by being rendered incohesive and porous, may receive manure less decomposed than well-pulverized turnip soils require. Some plants, too, seem to thrive better with fresh dung than others,—potatoes in particular; but all the small-seeded plants, such as turnips, clover, carrots, &c. which are extremely tender in the early stage of their growth, require to be pushed forward into luxuriant vegetation with the least possible delay, by means of short dung. The season when manure is applied is also a material circumstance. In spring and summer, whether it be used for corn or green crops, the object is to produce an immediate effect, and it should therefore be more completely decomposed than may be necessary when it is laid on in autumn for a crop whose condition will be almost stationary for several months.

2. *Lime.*

Lime.

Next to farm-yard dung, lime is in most general use as a manure, though it is one of a quite different character; and when judiciously applied, and the land laid to pasture, or cultivated for white and green crops alternately, with an adequate allowance of putrescent manure, its effects are much more lasting, and in many instances still more beneficial, than those of farm-yard dung. Fossil manures "must produce their effect, either by becoming a constituent part of the plant, or by acting upon its more essential food, so as to render it more fitted for the purposes of vegetable life." (Davy's *Agricultural Chemistry*, p. 314.) It is perhaps in the former of these ways that wheat and some other plants are brought to perfection after lime has been applied upon land that would not bring them to maturity by the most liberal use of dung alone.

"The most common form in which lime is found on the surface of the earth, is in a state of combination with carbonic acid or fixed air. If a piece of limestone or chalk be thrown into a fluid acid, there will be an effervescence. This is owing to the escape of the carbonic acid gas. The lime becomes dissolved in the liquor. When limestone is strongly heated, the carbonic acid gas is expelled, and then nothing remains but the pure alkaline earth; in this case there is a loss of weight, and if the fire has been very high, it approaches to one-half the weight of the stone; but in common cases, limestones, if well dried before burning, do not lose much more than from 35 to 40 per cent., or from seven to eight parts out of twenty. When burned lime becomes mild, it regains its power of effervescing, and is the same chemical substance as chalk or limestone.

Loss of weight by burning.

Slacked lime.

"When newly burned lime is exposed to air, it soon falls into powder; in this case it is called slacked lime; and the same effect is immediately produced by throwing water upon it, when it heats violently and the water disappears. Slacked lime is merely a combination of lime with about one-third of its weight of water, that is, 55 parts of lime absorb 17 parts of water.

Operation of lime.

"When lime, whether freshly burned or slacked, is mixed with any moist fibrous vegetable matter, there is a strong action between the lime and the vegetable matter, and they form a kind of compost together, of which a part is usually soluble in water. By this kind of operation, lime renders matter which was before comparatively inert nutritive; and as charcoal and oxygen abound in all vegetable matters, it becomes at the same time converted into carbonate of lime.

"Mild lime, powdered limestone, marls, or chalks, have no action of this kind upon vegetable matter; by their action they prevent the too rapid decomposition of substances already dissolved, but they have no tendency to form soluble matters.

"It is obvious, from these circumstances, that the operation of quicklime and marl or chalk depends upon principles altogether different. Quicklime, in being applied to land, tends to bring any hard vegetable matter that it contains into a state of more rapid decomposition and solution, so as to render it a proper food for plants. Chalk and marl, or carbonate of lime, will only improve the texture of the soil, or its relation to absorption; it acts merely as one of its earthy ingredients. Quicklime, when it becomes mild, operates in the same manner as chalk; but, in the act of becoming mild, it prepares soluble out of insoluble matter.

"The solution of the question, whether quicklime ought to be applied to a soil, depends upon the quantity of inert vegetable matters that it contains. The solution of the question, whether marl, mild lime, or powdered limestone, ought to be applied, depends upon the quantity of calcareous matter already in the soil. All soils are improved by mild lime, and ultimately by quicklime, which do not effervesce with acids, and sands more than clays." (Davy's *Agricultural Chemistry*, p. 315, *et seq.*)

From the mode in which lime operates, it necessarily follows that quicklime should not be applied to lands that contain much soluble matter, nor be mixed up in composts with animal manures.

Magnesian limestone.

"It had been long known to farmers in the neighbourhood of Doncaster, that lime made from a certain limestone, applied to the land, often injured the crops considerably. Mr Tennant, in making a series of experiments upon this peculiar calcareous substance, found that it contained magnesia; and on mixing some calcined magnesia with soil, in which he sowed different seeds, he found that they either died, or vegetated in a very imperfect manner, and the plants were never healthy. And, with great justice and ingenuity, he referred the bad effects of the peculiar limestone to the magnesian earth it contains." (*Id.* p. 322.) Yet it is advantageously employed in small quantities, seldom more than 25 or 30 bushels to the acre. A simple test of magnesia in the limestone is the circumstance of its effervescing little when plunged into an acid, and its rendering diluted nitric acid or aquafortis milky. Stones of this kind are usually coloured brown or pale yellow, and are found in several counties of England, and in many parts of Ireland, particularly near Belfast.

Quantity applied to different soils.

With regard to the quantity of lime that ought to be applied to different soils, it is much to be regretted that Sir Humphry Davy did not enter fully into the subject. Clays, it is well known, require a larger quantity than sands or dry loams. It has been applied, accordingly, in almost every quantity from 100 to 500 bushels or upwards per acre. About 160 bushels are generally considered a full dressing for lighter soils, and 80 or 100 bushels more for heavy cohesive soils.

General rules.

In the application of lime to arable land, there are some general rules commonly attended to by diligent farmers, of which we shall present an abstract.

1. As the effects of lime greatly depend on its intimate admixture with the surface soil, it is essential to have it in a powdery state at the time it is applied.

2. Lime having a tendency to sink in the soil, it should be ploughed in with a shallow furrow.

3. Lime may either be applied to grass land, or to land in preparation for green crops or summer fallow, with almost equal advantage; but, in general, the latter mode of application is to be preferred.

4. Lime ought not to be applied a second time to moorish soils, unless mixed up as a compost; after which the land should be immediately laid down to grass.

5. Upon fresh land, the effect of lime is much superior to that of dung. The ground, likewise, more especially where it is of a strong nature, is more easily cultivated; in some instances, it is said, "the saving of labour would be sufficient to induce a farmer to lime his land, were no greater benefit derived from the application than the opportunity thereby gained of working it in a more perfect manner." (*General Report of Scotland*, vol. ii. p. 536.)

Effects of lime in improving hilly land laid down to pasture.

In improving hilly land with a view to pasture, a much smaller quantity of lime has been found to produce permanent and highly beneficial effects, when kept as much as possible near the surface, by being merely harrowed in with the seeds, after a fallow or green crop, instead of being buried by the plough. As this is a matter of much importance to farmers of such land, especially when lime must be brought from a great distance, as was the case in the instance to which we are about to allude, the successful practice of one of the most eminent farmers in Britain cannot be too generally known.

"A few years after 1754," says Mr Dawson, "having a considerable extent of outfield land in fallow, which I wished to lime previous to its being laid down to pasture, and finding that I could not obtain a sufficient quantity of lime for the whole in proper time, I was induced, from observing the effects of fine loam upon the surface of similar soil, even when covered with bent, to try a small quantity of lime on the surface of this fallow, instead of a larger quantity ploughed down in the usual manner. Accordingly, in the autumn, about twenty acres of it were well harrowed, and then about fifty-six Winchester bushels only, of unslacked lime, were, after being slacked, carefully spread upon each English acre, and immediately well harrowed in. As many pieces of the lime, which had not been fully slacked at first, were gradually reduced to powder by the dews and moisture of the earth,—to mix these with the soil, the land was again well harrowed in three or four days thereafter. This land was sown in the spring with oats, with white and red clover and ryegrass seeds, and well harrowed, without being ploughed again. The crop of oats was good, the plants of grass sufficiently numerous and healthy; and they formed a very fine pasture, which continued good until ploughed some years after for corn.

"About twelve years afterwards I took a lease of the hilly farm of Grubbet, many parts of which, though of an earthy mould tolerably deep, were too steep and elevated to be kept in tillage. As these lands had been much exhausted by cropping, and were full of couch-grass, to destroy that and procure a cover of fine grass, I fallowed them, and laid on the same quantity of lime per acre, then harrowed and sowed oats and grass-seeds in the spring, exactly as in the last mentioned experiment. The oats were a full crop, and the plants of grass abundant. Several of these fields have been now above thirty years in pasture, and are still producing white clover and other fine grasses: no bent or fog has yet appeared upon them. It deserves particular notice, that more than *treble* the quantity of lime was laid upon fields adjoining of a similar soil, but which being fitter for occasional tillage, upon them the lime was ploughed in. These fields were also sown with oats and grass-seeds. The latter throve well, and gave a fine pasture the first year; but afterwards the bent spread so fast, that in three years there was more of it than of the finer grasses."

The conclusions which Mr Dawson draws from his extensive practice in the use of lime and dung, deserve the attention of all cultivators of similar land.

Conclusions as to the effects of lime and dung.

"1. That animal dung dropt upon coarse benty pastures produces little or no improvement upon them; and that, even when sheep or cattle are confined to a small space, as in the case of folding, their dung ceases to produce any beneficial effect after a few years, whether the land is continued in pasture or brought under the plough.

"2. That even when land of this description is well fallowed and dunged, but not limed, though the dung augments the produce of the subsequent crop of grain, and of grass also for two or three years, that thereafter its effects are no longer discernible either upon the one or the other.

"3. That when this land is limed, if the lime is kept upon the surface of the soil, or well mixed with it, and then laid down to pasture, the finer grasses continue in possession of the soil, even in elevated and exposed situations, for a great many years, to the exclusion of bent and fog. In the case of Grubbet-hills, it was observed, that more than thirty years have now elapsed. Besides this, the dung of the animals pastured upon such land adds every year to the luxuriance, and improves the quality of the pasture, and augments the productive powers of the soil when afterwards ploughed for grain; thus producing, upon a benty outfield soil, effects similar to what are experienced when rich infield lands have been long in pasture, and which are thereby more and more enriched.

"4. That when a large quantity of lime is laid on such land, and ploughed down deep, the same effects will not be produced, whether in respect to the permanent fineness of the pasture, its gradual amelioration by the dung of the animals depastured on it, or its fertility when afterwards in tillage. On the contrary, unless the surface is fully mixed with lime, the coarse grasses will in a few years regain possession of the soil, and the dung thereafter deposited by cattle will not enrich the land for subsequent tillage.

"*Lastly*, It also appears from what has been stated, that the four-shift husbandry is only proper for very rich land, or in situations where there is a full command of dung; that by far the greatest part of the land of this country requires to be continued in grass two, three, four, or more years, according to its natural poverty; that the objection made to this, viz. that the coarse grasses in a few years usurp possession of the soil, must be owing to the surface soil not being sufficiently mixed with lime, the lime having been covered too deep by the plough." (*Farmer's Magazine*, vol. xiii. p. 69.)

Quantity of calcareous matter in different limestones.

Limestones differ much in purity, or in the quantity of calcareous matter which they contain. According to Mr Headrick (*Farmer's Magazine*, vol. v. p. 451) it is usually from 60 to 85 per cent.; but he afterwards analyzed some limestones from the county of Fife, which contained 99½ per cent. of carbonate of lime, the residuum being fine clay. Farmers generally estimate the purity of limestones by the quantity of slacked lime produced from a given quantity of burnt limestone, or shells as it is usually called, the pulverized lime of the best shells being three times the measure of the shells. But it is easy to ascertain the quantity of calcareous matter in the stone itself, by the use of muriatic acid; that stone being the best which leaves the least sediment, the lime itself dissolving in the acid.

3. *Marls.*

Marls.

Marl, which was more extensively employed as a manure in former times than it has been of late, since the properties of lime have been better understood, is usually divided into *stone*, *clay*, and *shell* marl, of which the last is the most valuable. All marls contain a portion of calcareous matter, and their operation is not materially different from that of mild lime, as has been formerly noticed; but the greater quantity required, owing to the smaller proportion of calcareous matter which they contain, confines the use of them to a few miles around the places where they are found. The effects of marl are slower than those of quicklime, but, from the earthy substances combined with the calcareous matter, and the larger quantity usually applied, the staple of the soil is deepened, and the benefit is considered more durable.

4. *Sea-Weed.*

Sea-weed.

This is an excellent manure, though not lasting in its effects, suited to all soils and crops, with the exception perhaps of clovers of the first year's growth. It should be applied fresh as it is gathered, if the land be ready to receive it, otherwise it may be mixed up with fresh dung, or used as a top-dressing to grass-lands.

5. *Bones and Horns.*

Bones.

Bones are a source of manure too little attended to in most places, though their value is well ascertained by a pretty extensive experience of their effects in several districts. The following particulars were transmitted from Yorkshire, in answer to some queries proposed by the writer of this article.

"1. It is thought that all the bones of every animal are *not* equally valuable; but all the bones of an animal suitable for manure are equally good, and are much better when fresh.

"2. The bones which are best filled with oil and marrow are certainly the best manure; and the parts generally used for buttons and knife-hafts are the thigh and shank-bones.

"3. The *powdered* bones are dearer, and generally used for hot-beds in gardens, being too expensive for the field, and not so durable a manure as *bruised* bones, though for a short time more productive.

"4. A dry, light or gentle soil, is best adapted for the use of bone manure, as it is supposed that, in land which retains wet, the nutritive part of the bone washes to the surface of it, and does not incorporate sufficiently with the soil.

"5. The autumn is the most proper time for the use of this manure, which should then be laid on fallows for a turnip crop. The powder only should be used on a green crop, as the bruised bones would interrupt the progress of the scythe.

"6. The effects produced on different crops are generally good on such soil as named in No. 4.

"7. Bruised bones are better when mixed with ashes or any other manure, as the juice of the bones is then more equally spread over the field.

"8. Bone manure ought to be ploughed into the land in tillage. On grass, the powder should be sown in by the hand.

"9. This manure is used on land before described, to the extent of several thousand acres, in the *higher* parts of Nottinghamshire, and the *wolds* (or high land) in Lincolnshire, and the East and West Riding of Yorkshire.

"10. The primary object of keeping a bone mill is the bruising of bones, which pays better than selecting and selling such as are suitable for buttons, &c.

Mill for bruising bones.

"11. In an agricultural district, where the generality of the land is of the nature before mentioned as best suited for bone manure, a mill for the purpose of bruising bones would certainly indemnify the proprietors. The cost of a mill is from L.100 to L.200. As to the number of miles the manure may be carried, the proprietors of the mill will be best able to judge of that." See Plate X.

The use of bones as a manure has been only recently introduced into Scotland; but the experiments, as far as they have gone, are highly satisfactory, and the practice is rapidly extending.

Experiments.

The following account of some of these experiments, extracted from the *Quarterly Journal of Agriculture*, is given by the gentleman who made them, Mr Watson of Keillor, near Cupar-Angus, in a communication dated in February 1828. Mr Watson obtained bone manure for two acres in 1821, the greatest quantity recommended being 25 bushels for the Scotish acre. "This," says he, "I applied, the following turnip-sowing season, to two acres of a field of sharp black land on this farm, and on two adjoining acres of the same field I applied 25 cart-loads per acre of well-made farm-yard dung. The season, at time of sowing, was rather wet, and not very favourable for the first growth of turnips. Those with bones came above ground on the third day very dark coloured and broad in the leaf, and by the tenth day they were all in the rough blade. At this time I examined the state of the manure, and found it one mass of maggots; but two days after they were all dead; and the weather being now dry and warm, the most rapid vegetation I ever remarked took place; so that by the fifteenth day from time of sowing, the turnips were fully strong for being thinned out. This operation I had performed by women, pulling out the spare plants with their hands (being afraid to remove any part of the manure from the roots of the plants); but I have since found that the common turnip-hoe, carefully used, does the work very well, and leaves the manure undisturbed.

"The plants where the farm-yard dung was applied did not come up till the fifth day, and the turnips were twenty days sown before they were fit for being thinned. By this time the bone turnips were meeting on the top of the drill, and they continued to maintain the advantage of their first start until the month of September, which set in rather dry. At this time I anticipated that the bones would be exhausted, and the crop stop growing; but such was not the case, for while the dunged crop began to fade and stop growing, the bone turnip kept growing vigorously. About the middle of October, when I considered both crops at maturity, I had a comparative trial of their weight carefully made, the result of which was six tons per acre in favour of the bones,—they being 28 tons per acre of Aberdeenshire yellow turnip, and the farm-yard dung only 22 tons per acre.

"From this experiment, and the valuable information I had now obtained through my friend Mr Healy of Loughton, in Lincolnshire, I was induced to extend the use of bones on my farms, growing annually from 70 to 100 acres of turnips with this manure, which gives me a great command of dung for my other crops. In 1823 I erected machinery for grinding bones, my neighbours having now all become convinced of their great utility; and the first season I sold to the amount of L.1500 worth. This last season, not less than L.10,000 has been paid for bones used in this district of Strathmore, in the counties of Angus and Perth, a great part of which was commissioned from Hull. There are now machines erected for grinding bones in various parts of the country; so that the expense of inland carriage is in many cases much lessened.

"The general practice is, to use bones on dry light soils, where the turnip can be eat off the ground with sheep, in such proportion (not less than one half) as may be reckoned necessary to manure the ground for an after-crop of oats or barley. The quantity of bone manure may be varied from 15 to 25 bushels of dust per acre, according to the state of the land. Some difficulty was at first found in depositing the bones so that the plants might reap all the benefit of it; but this is now obviated by the application of two additional hoppers and spouts to the turnip sowing machine, which conduct the manure and seed into the drill at the same time, and with the same expedition as sowing the seed by the old machine. These barrows are made by most carpenters in the country, and cost about L.8.

"Doubts have been raised whether the succeeding crop of oats or barley is in any degree benefited by the small quantity of bones used in growing a crop of turnips. I can confidently state, that on my farms both the quantity and quality, of my barley particularly, have been improved, and the grass for the first year is a fortnight earlier in its growth than after other manures.

"In the crop of 1825 the bone manure was a great blessing to the breeders and feeders of cattle in this district, and in some instances saved the industrious tenant from ruin. The severe drought even of that season did not prevent a crop of turnips with bones, while all other manures failed; and it was thus the means of bringing through that disastrous winter, herds of cattle which must have otherwise perished for want of fodder."

Horn, says Sir H. Davy, is a still more powerful manure than bone, as it contains a larger quantity of decomposable animal matter. The shavings or turnings of horn, though they cannot be procured in great abundance, are much esteemed as a manure, and have been long known to the farmers in the west of Scotland, who sometimes bring them from Ireland. They are sown by the hand as a top-dressing for wheat and other crops.

6. *Burnt Clay.*

Burnt clay.

This is a mode of preparation which was introduced into the west of Scotland some years ago from Ireland, by Mr Craig at Cally, in the stewartry of Kirkcudbright. That its effects have been beneficial in many cases cannot well be doubted, and it is still in use by some very intelligent cultivators. But, as frequently happens, it was recommended too warmly and in too unqualified a manner by its earliest promoters; and experience in many instances not having confirmed their statements, it has of late fallen into disrepute, and is now but little employed. It will therefore be sufficient to refer to the *Farmer's Magazine*, vol. xvi., where the practice is treated at some length by those who first brought it into notice.

7. *Miscellaneous Articles.*

We shall now mention some of those numerous vegetable, animal, and other substances, which, though not in general use as manures, are sometimes employed for that purpose, in particular situations.

Meadowbank manure.

It had been long known that moss or peat, made up in compost with farm-yard dung, affords a valuable manure; but it was first introduced to general notice by the late Lord Meadowbank. The usual proportions may be about two-thirds of moss and one-third of farm-yard dung, spread out in layers, one above another, in forming the dung heap, but the bottom and top should be of moss. This heap in a few days acquires a considerable degree of heat, indicating the progress of the process of fermentation. It is then turned over, and made up again with or without a further addition of moss and dung. When this compost has been properly managed, the whole heap forms a homogeneous mass, moist, black, friable, and excellently adapted to turnips, and all other crops that require rotted dung. No lime or other calcareous matter should be admitted into the compost.

The same object of increasing the quantity of manure may be obtained by carting the moss to the farm-yard in which cattle are kept, where, without any further trouble, it will become mixed up with their litter and dung, and be carted out to the fields in one mass.

Experiments with oil in compost with moss and dung.

Some very interesting and successful experiments have been made with oil mixed up with farm-yard dung and moss, by Mr William Bell, on his estate in Roxburghshire. We have entire confidence in the accuracy of this gentleman's statements, and present them in his own words in a recent communication to the Highland Society of Scotland.

"The object in view in the experiment now to be detailed, was to procure the means of converting moss, or other decayed vegetable substance, into a rich top-dressing, in a situation so far inland, that the expense of carriage from the sea-coast (L.2. 5s. per ton) precluded the use, with any expectation of profit, of blubber, bone, rape-dust, or other similar substances. Attention had been drawn to oil as a manure, by the practice of the Flemings, in forming their liquid dung-pits, and by the fact that, in the use of blubber and rape-cake for this purpose, the benefits following their application are in the precise proportion of the inefficacy of the means employed for expressing the oil from them. It was also conceived, that, to a certain extent at least, the nutritious matter contained in bone-dust may be traced to the oleaginous particles of the bony substance.

"It was resolved to commence with one ton of oil, and such a proportion of moss as, in all probability, that quantity of oil could easily convert by heating, into a more profitable substance.

"It was further resolved, that the process of heating should be aided by a certain quantity of stable-dung, and that 250 cubic yards of moss to the ton of oil should, in the first instance, be tried with 25 cubic yards of dung, though it was expected that a much greater quantity of moss might be fully converted into manure by that quantity of oil and dung.

"A ton of "dreg," or coarse whale-oil, therefore, costing L.16, was purchased at Leith, and sent out at the cost of L.2. 10s. In the beginning of June 1825, a bed was formed a foot thick of moss, which had been thrown out some time before, but which still retained all its peaty qualities, and which, though still moist, yet having lain in a heap for some months, was substantially freed of much of its superfluous moisture.

"Twenty-five cubic yards of good stable-dung were then laid in a thick layer upon this bed; above which, another layer of moss was laid, fully a foot thick. On this second layer of moss the whole quantity of oil was poured, and the residue of the moss was laid above all, and along the sides, so as completely to cover the whole well up.

"In ten days the whole mass came freely into heat. It was turned after an interval of about eight weeks, when it was found to have been greatly changed in its texture and quality. After having been so treated, it heated freely again, and, on inspection, was found to have been altogether altered. It had now all the appearance of the richest possible black garden-mould, and was quite full of large, fat earth-worms. It gave out a strong oily smell, from which it was inferred that too little moss had been used; and some apprehension was entertained as to its fitness for being applied to its primary destination,—a top-dressing for grass-land.

"The costs were as follows:—

Oil and carriage,	L. 18	10	0
Twenty-five cubic yards stable-dung, at 5s., the usual price of the country,	6	5	0
	L. 24	15	0

"No charge for casting the peat is made, both because in this instance it was desirable to consume the substance which had been thrown out of the ditches, and because the compound lay contiguous to the ground on which it was to be used, while the cost of casting and turning was deemed equivalent to the carriage afield of the manure that would have been required.

260 cubic yards compound, at 1s. 11¼d., about	L.25	3	9

"The farm-steward was of opinion that the produce was so rich as safely to admit of its being used in equal quantities with ordinary farm-dung. Two several portions of land, each of half an acre, were accordingly devoted to a trial of its powers on that principle; the one, rich old turnip soil, worth 40s. of rent per English acre; the other, new turnip land, which had never been broken up. These portions were laid off in the centre of the two several fields, and the manure was applied to the turnip crop in the usual way. The other parts of both fields were dunged with farm-yard manure,—equal quantities of it and of the compound being given to the acre. The summer 1826 was not favourable to turnip-crops generally; but it so happened that the crops on both these fields were very great.

"On the old land, the turnips grown with the oil compound sprung earlier than on the rest of the field, grew larger, and were more luxuriant, and very decidedly kept the lead, both in root and shaw, during the whole season; but absence from the spot prevented a minute register of weight and measure being kept.

"On the new land, no difference could be distinguished betwixt the crop from the two several manures: both were so good, that better could scarce have grown.

"In the next crop (oats on both fields), though minutely inspected, no difference in produce could be detected; but the same causes prevented the circumstances of the case being duly attended to.

"This year both fields are in grass, and both will be hayed. At present (30th June) no difference can be detected.

"No inconvenience from the oily smell was felt when the residue of the compost was applied to grass-land. It was laid on early, and the ground was hayed. It was given to the meadows last improved, and therefore the least advanced; while rush-root compound, and other substances, were given to the older portions. The crop on each was very great; but the preference was rather given to the oil.

"These results were so far encouraging, that next year, 1826, two tons of oil were purchased at the price of L.14 per ton, and used with rather less than 90 cubic yards of manure, and fully 900 of moss. About 550 cubic yards were used in the first instance, in the same manner as on the former occasion, and the residue of 350 thrown in when the compound was turned. It is now believed, however, that it would have been better to have made up the whole at once, by adding to the thickness of the several layers of moss, especially the centre one.

"The cost on this occasion was as follows:—

Oil, two tons, and carriage,	L.33	0	0
90 cubic yards manure, at 5s. per yard,	22	10	0
990 cubic yards compound, at 1s. 1¾d., about	56	18	9

"The result again was very satisfactory; the moss heated fully the first time, and freely the second, notwithstanding the error committed,—the result of which was apparently to check the second fermentation a little, and to leave lumps here and there not quite decomposed. But the whole has been substantially and effectually changed, and confirms, in every respect, the result of the former experiment.

"On both occasions, moss thrown out at the same time remained altogether unchanged: while the one was luxuriantly covered with vegetable growth, the other continued a sterile heap.

"This year, five tons of oil have been bought at L.9 per ton, and carriage 40s.	L.55	0	0
On the same principle as before, the dung will cost, for 225 cubic yards, at 5s.	56	5	0
To be used with 2250 cubic yards of moss,	111	5	0
2475 cubic yards produce, at 10¾d., about	110	17	2¼

"The effect of these operations is probably twofold. In the first place, the oil, thus divided, may be rendered a fit element for the nutrition of plants; and, in the second place, unquestionably much benefit is secured by the change effected on the substance of the peaty matter. Fully the larger share of benefit is ascribed to this circumstance; but, at the same time, it is very probable that it may be found by experiment that oil may with great advantage be used with every other species of manure, or even with compounds of purely earthy ingredients."

Manure, in a liquid state, is used to a considerable extent in Flanders, where the utmost attention is paid to the collecting of every substance that can serve to enrich the soil. This consists of urine in which rape-cake has been dissolved, the former being collected in subterraneous drains of brick-work, from which it is raised by a temporary pump, and delivered into carts for being carried to the field, where it is spread by means of hollow shovels or scoops. This is the manure almost universally used for the flax crop, to which it is applied at the rate of about 2500 gallons English beer measure the acre.

Salt.

Salt has been warmly recommended within these few years as a valuable manure, and at the same time for its property in destroying weeds. The recent repeal of the duties on salt has rendered this substance accessible to farmers in every part of the country; and it has been subjected to a variety of experiments. These, as might be expected, have not always given the same results; but the best attested experiments do not seem to have been attended with such success as to justify the encomiums that were at one time lavished upon this substance; and the general impression among farmers is, that it is of little or no value whatever as a manure. We are aware that a difference of opinion still exists on this point; but such is the opinion we have come to, on what we conceive to be the best authorities.

Succulent plants.

Rape-cake.

Carcasses of animals.

Fish.

Blubber.

Of the substances of vegetable or animal origin occasionally or locally applied in this way, the number is very great. All *green succulent plants* add to the fertility of soil when ploughed into it; and it is by no means uncommon to cultivate buck-wheat and other plants expressly for this purpose. *Thistles*, *docks*, and other noxious weeds, which at any rate should be always cut down before forming their seeds, may be advantageously used as manure, and are sometimes mixed with farm-yard dung when laid out to ferment, in the manner already described. *Rape-cake* is an excellent dressing for turnips, and is most economically applied when thrown into the soil at the same time with the seed.[1] By covering *dead animals* with five or six times their bulk of soil, mixed with one part of lime, and suffering them to remain for a few months, their decomposition impregnates the soil with soluble matters, so as to render the mass an excellent manure; and by mixing a little fresh quicklime with it at the time of its removal, the disagreeable effluvia may be in a great measure destroyed.[2] *Fish* are well known to be a powerful manure, though the quantity should be limited. A full crop of turnips has been got from spoiled herrings laid on before the winter ploughing, at the rate of twenty-five barrels to an acre.[3] *Blubber* has been used with great success by Lord Somerville, mixed with clay, sand, or any common soil, so as to expose a large surface to the air;[4] but it has been found injurious in some instances,[5] probably owing to its having been applied too largely, as has happened in the case of fish, or from not having been combined with a sufficient quantity of soil.

Curriers' shavings, &c.

Urine.

Night-soil.

Pigeons' dung.

The *refuse* of the different manufactures of *skin* and *leather* affords very useful manures, such as the shavings of the currier, furriers' clippings, and the offals of the tan-yard and of the glue-maker. The value of *urine* is well known. According to Sir H. Davy, it should be used as fresh as possible, but not without being diluted with water. *Night-soil* is a most powerful manure. The disagreeable smell may be destroyed by mixing it with quicklime. The Chinese mix it with one-third of its weight of fat marl, make it into cakes, which are said to be a common article of commerce, and dry it by exposure to the sun.[6] Next to this, in its fertilizing powers, is *pigeons' dung*, commonly used in a dry state as a top-dressing, at the rate of about twenty bushels to an acre.[7]

Lime-stone gravel, &c.

Gypsum.

Soot.

Sleech.

Mud.

Schistus.

Manures of a mineral or fossil origin are also numerous. *Limestone gravel*, which abounds in Ireland, *chalk*, *pounded limestone*, *sea-shells*, and *shelly sand*, are all employed, some of them to a considerable extent, in much the same manner as lime; but their effect, though durable, is not so immediate. *Gypsum*, or sulphate of lime, is found in several parts of England, but its value as a manure does not yet appear to be clearly determined. It does not seem to operate by accelerating putrefaction,[8] but it is supposed that lands which have ceased to bear good crops of clover or cultivated grasses may be restored by being manured with gypsum, as it is found in considerable quantities in their ashes.[9] *Soot* is known to be a useful top-dressing, either by itself or when mixed with earth and lime, in the proportion of one part soot, five parts earth, and one part lime;[10] but its effects are not lasting. *Sleech* or *sea-ooze*, containing animal and vegetable substances, with a large proportion of calcareous matter, affords a valuable dressing, increasing the staple of the soil to which it is applied, as well as its fertility. *Pond* and *river-mud*, mixed with lime, has been often applied with good effect. Even *coal-sill* or *schistus* has been used with much advantage by Mr Curwen and others, after being decomposed with lime, in the proportion of one part of the latter to six of the former.[11]

Town dung.

The great quantity of valuable manure obtained from large towns is a mixture of almost all these ingredients; and what was formerly a nuisance is now a source of revenue to the inhabitants, and of fertility to the country around them.

Folding.

In several districts land is manured on the surface, by cattle and sheep confined in temporary folds. See the chapter on LIVE STOCK, where the benefits of this practice will be inquired into. Its expediency is a question that cannot be determined without a reference to its effects on the animals themselves, as well as to the value of the manure.

SECT. IX. WARPING.

Warping.

This is a mode of fertilizing lands, by depositing a coat of alluvial matter on their surface, and is practised on the borders of large rivers and estuaries into which the tides flow. It is said to have been first tried on the banks of the Humber about a century ago, but was first brought into notice by Marshall in 1788, and afterwards by the *Report of the West Riding of Yorkshire*. A similar practice has been long known in Italy.

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[1] Davy's *Agricultural Chemistry*, p. 281.

[2] *Ibid.* p. 288.

[3] *Ibid.* and *General Report of Scotland*, vol. ii. p. 527.

[4] Davy's *Agricultural Chemistry*, p. 289.

[5] *Farmer's Magazine*, vol. xvi.

[6] Davy's *Agricultural Chemistry*, p. 298.

[7] Davy's *Agricultural Chemistry*, p. 299, and *General Report of Scotland*, vol. ii. p. 545.

[8] Davy's *Agricultural Chemistry*, p. 331.

[9] *Ibid.* p. 332, 333.

[10] *Ibid.* p. 341, and *General Report of Scotland*, vol. ii. p. 543.

[11] *Farmer's Magazine*, vol. xiv. p. 286.

The waters of the tides that come up the Trent, the Ouse, the Don, and other rivers which empty themselves into the great estuary of the Humber, are so loaded with mud, that if a cylindrical glass twelve or fifteen inches long be filled with them, there will presently be deposited an inch or sometimes more of what is called warp. But where this matter comes from has been the subject of dispute; for the water of the Humber at its mouth is clear, and in the very driest seasons the warp is most plentiful. The improvement consists in nothing more than letting in the tide at high water, to deposit the warp, and permitting it to run off again as the tide falls.

The effect of this practice is to cover the surface with a new soil, which may be raised in the course of one summer from 6 to 16 inches, so that it is immaterial what may be the nature of the original soil; and the whole surface is left quite level, whatever hollows there may have been before being now filled up.

The operation begins usually in the month of July, and proceeds during the rest of the summer season. The expense is said not to exceed L.12 or L.15 the acre; and land has been known to rise in value by warping from L.5 to L.40 or L.50 per acre. This new soil is so rich that it will carry very large crops for several years afterwards without any manure; but it should be sown with clover, and left in that state for two years, before it is opened for corn: it will then bear any sort of crop suited to the quality of the soil. In this respect there is a considerable difference even upon the same field, the warp in some places being a strong loam, and in others light and friable. For a more particular description of this process, the reader is referred to the *Agricultural Survey of the West Riding of Yorkshire.*

The Italian practice referred to is thus described by an intelligent tourist:—

Colmata.

"In the Val di Chiana, fields that are too low are raised and fertilized by the process called *Colmata*, which is done in the following manner. The field is surrounded by an embankment to confine the water. The dyke of the rivulet is broken down so as to admit the muddy water of the high floods. The Chiana itself is too powerful a body of water to be used for this purpose; it is only the streams that flow into the Chiana that are used. This water is allowed to settle and deposit its mud upon the field. The water is then let off into the river at the lower end of the field, by a discharging course called *scolo*, and in French, *canal d'écoulement.* The water-course which conducts the water from a river, either to a field for irrigation or to a mill, is called *gora*. In this manner a field will be raised five and a half, and sometimes seven and a half feet in ten years. If the dyke is broken down to the bottom, the field will be raised the same height in seven years; but then in this case gravel is also carried in along with the mud. In a field of 25 acres, which had been six years under the process of *Colmata*, in which the dyke was broken down to within three feet of the bottom, the process was seen to be so far advanced, that only another year was requisite for its completion. The floods in this instance had been much charged with soil. The water which comes off cultivated land completes the process sooner than that which comes off hill and woodland. Almost the whole of the Val di Chiana has been raised by the process of *Colmata*." (*Journey in Carniola, Italy, and France*; by W. A. Cadell, Esq. F. R. S.)

Sect. X. Farm Drains.

Farm drains.

Though we propose to treat of the important subject of drainage in a separate article, yet it seems proper here to notice such drains as are usually executed by farmers themselves, without the assistance of a professional man. These may be divided into such as are best suited to soils rather loose and incohesive, and such as are best adapted to alluvial clays or soils of a uniform and close texture.

On mixed soils.

With regard to the first sort of drains, the practice is to cut them in such a situation as to catch the spring before it oozes out of the subsoil and spreads itself over the surface. In common language, the line of the drain commences between the "wet and the dry," and is of such a depth as may be necessary to get down to the porous or sandy subsoil from which the spring emerges. In general from two and a half feet to three and a half feet may be a sufficient depth; and where the spring is not found at the latter depth, tapping or boring may be resorted to. These drains are cut about the breadth of the spade at bottom, and opened no wider at the surface than is necessary to give room to the labourer to work, which may be usually from fifteen to eighteen inches. The best material for filling them up with is small round stones, which are usually to be got from the surface of the land itself; but a variety of other materials are occasionally employed, such as furze, broom, and even straw, in situations where stones cannot be readily procured. If there be reason to expect a constant current of water in the bottom of the drain, some care must be taken in laying the stones at the bottom, by forming a sort of arch, or by building up either side a few inches, and laying flat stones as a coping above, leaving a clear space for the stream below. But in most cases it is sufficient to select small round stones for the bottom, which are thrown in promiscuously, the interstices, as in the case of gravel, allowing the water to percolate freely through them. When the drain has been filled up to within ten or twelve inches of the surface, the stones are covered with turf or sod, the grassy side undermost, and then the earth that had come out of the drain is thrown above until it comes to the level of the surface. It is obvious, that to insure the free working of these drains, they must never be disturbed by the plough, and therefore the covering of earth should be always somewhat deeper than the plough works.

On clay soils.

On alluvial or clayey soils not infested with springs, the evil is necessarily somewhat different, and requires a different remedy. Here the soil is of itself tenacious of moisture, and does not allow the rain water to pass freely through it. On such soils it may be thought that covered drains can be of little use; but long experience has proved their efficacy, and the practice has within these few years been introduced into Scotland from Essex and other parts of England. It is thus described in a communication to the Highland Society of Scotland, and our own observation can bear witness to the writer's accuracy.

Wedge drains.

"The work is performed by means of three spades of different sizes. The first may be a common spade of moderate breadth, with which the surface-clay may be taken off to the depth of eight or ten inches, or not quite so much if the clay be very strong. The breadth of the drain at top may be from a foot to fifteen inches, but it should never be less than a foot, as it is an advantage that the sides should have a considerable slope,—and the two sides should slope as equally as possible. Another workman follows the first, with a spade six inches broad at the top, and becoming narrower towards the point, where it should not exceed four inches. The length of the plate of this second spade should be fourteen inches, and with it a foot or fourteen inches in depth can easily be gained. A third workman, and he should be the most expert, succeeds the second, and his spade should be four inches broad at the top, only two inches broad at the point, and fourteen or fifteen inches in length. With this spade a good workman can take out at least fifteen inches of clay. A sort of hoe or scoop, made of a plate of iron formed nearly into the shape of a half-cylinder, of two inches diameter and a foot or fourteen inches long, and fastened at an acute angle of perhaps 70° to a long wooden handle, is now employed to scrape out the bottom of the drain, and remove any small pieces of clay that may have fallen into it.

"This completes the cutting of what is by the workmen called a three *stamp* drain. Where circumstances may render it necessary, they may be made of four, five, or more *stamps*. I would in no case, unless perhaps where the land is to remain permanently in sheep-pasture, and is free from moles, recommend their being made less than three feet deep; and I am inclined to think, that where levels will admit of it, it would almost always be more advantageous that the depth should be four feet. Where the field is in summer fallow at the time, six inches of depth can generally be gained by gathering the ridges pretty high, and taking as deep a water-furrow as possible, with a wide-set plough. Three *stamps* or spits taken from the bottom of this water-furrow will give a depth of at least three feet and a half when the ridges are reduced to the proper shape, which is easily done in the course of the subsequent ploughings. In all cases I think it best to put a drain in every furrow, though some people put only one in every second furrow."

In filling these drains, turf matted with the roots of coarse grasses is considered the best material, though where this cannot be got, other articles, such as wood, peat, clay, and even straw, have been found to answer. "The turfs should be cut into an oblong shape, about four inches and a half broad (some make them narrower a little at the grassy side than at the other, but this is not very easily done, and I believe not very material), and from three to five inches thick. They are generally made about fourteen inches long. The grassy side of the turf being turned undermost, they are put down into the drain, the workman standing upon them after they are put in, and pressing them down with his whole weight till they are firmly wedged between the sloping sides of the drain. The ends of the turfs being cut somewhat obliquely, they overlap each other a little; and by this means, although there is sufficient opening for the surface-water to get down, nothing else can. The open space below the turf ought to be about five or six inches in depth, three inches wide at top, and one and a half or two inches at bottom. Some people prefer making the turf a little broader, and by that means leaving a larger space below, from the idea that it will be less likely to choke: but when the open space is much larger, the sides of the drain below the turf are probably more apt to give way for want of support.

"The operation may now be completed by turning in as much earth, either with the spade or the plough, as to fill up the drain to the proper level."—"I must remark, that the improvement has always appeared to me more striking in the first two or three crops than afterwards; and the reason, I apprehend, is, that although the drains remain perfectly clear, the clay above them becoming gradually more compact, the surface-water does not get down into them so quickly after a few years as it did at first.

"The price I now pay for cutting wedge-drains three feet deep, including the cutting of the turf and putting it in, is 4d. per rood of 20 lineal feet; and I am at the expense of carrying the turf from the place where it is cut, and laying it down close to the drains in a regular line, so that the person employed by the contractor in putting it in can easily reach it without coming out of the drain.

"The expense of draining per acre must, it is obvious, depend on the breadth of the ridges. Where these are of fifteen feet, the most common breadth in our carses, it will cost about L.2. 17s. per acre; but in wedge-drained land, I think the ridges may be advantageously made eighteen or twenty feet broad, which will of course be attended with a proportionate reduction of the expense of draining." (*Prize Essays and Transactions of the Highland Society of Scotland*, vol. vi.)

With respect to currents of water so considerable as not to admit of covered drains, the drains must of course be left open; but in this case it may usually be practicable to carry the water, by means of covered drains, into the fence-ditches, instead of leaving them open in the middle of the field. It has been already observed that a ditch forms a part of the fence, wherever the white thorn or other live hedges are employed for that purpose.

CHAP. II.

OF LAND UNDER PERENNIAL HERBAGE, AND IN A STATE OF NATURE.

Natural herbage.

There are few tracts of any extent throughout Great Britain, if we except the shifting sands on some parts of the coast, that do not bear plants of one kind or other; and having treated, in the preceding chapter, of crops raised by the labours of agriculture, it remains to consider those parts of our territory which nature has clothed with plants, the spontaneous products of soil and climate, and to mention the purposes to which these tracts are applied, and the improvements of which they are susceptible.

In the earlier stages of society, the *cerealia* used for the food of man necessarily obtain the principal attention of the cultivator. Little or no labour is required to provide food for the few animals whose assistance he needs in his rude operations; and herds and flocks, which propagate around him without his care, find the means of subsistence in those extensive wilds on which his feeble exertions have not yet materially encroached. Though he is chiefly indebted to these animals, at this period, both for his food and clothing, agriculture must have made considerable progress before he attempts to supply their occasional wants by improving their pastures or cultivating plants expressly for their maintenance. Until the middle of the seventeenth century, neither roots nor herbage were cultivated for live stock in England, nor in Scotland till about a hundred years after. The only provision for their subsistence, during the long winters of our latitude, was natural herbage in the state of hay, commonly the produce of some marshy or humid soils, along with the straw of corn; and during summer, the natural pastures, too generally occupied in common, were thought to require and to admit of little or no improvement.

Progress towards cultivated crops.

It is not till the increase of population, and the extension of tillage to supply its wants, that, in consequence of successive encroachments on the range of the inferior animals, it becomes necessary at last to allot a part of the cultivated land itself for raising their food. In most countries of Europe it is not found profitable, even at this day, to cultivate herbage and roots to any extent for feeding cattle; and the same course of successive crops of corn, with which the earliest agriculturists everywhere began their labours, still prevails almost universally in the north of Europe; not because all the land is required for producing grain, but, on the contrary, because the demand of the population for grain is so limited, compared with the extent of the country, as to leave the far greater part in the possession of the inferior animals, which in this case can be brought to market at a much lower price than would replace the charges of feeding them on crops raised by means of aration.

Greater part of Britain still allotted to live stock.

Other causes than the scantiness of population have produced a similar effect, though in a much smaller degree, in Great Britain; and by far the larger part of our territory also is still appropriated to the maintenance of live stock. A great portion of it, indeed, is incapable of being cultivated with any advantage; but meadows, pastures, and wastes, are spread over extensive tracts, that would yield cultivated crops in abundance, both for man and the inferior animals. Before concluding this article, we shall have occasion to notice what seem to be the causes of this state of things; but it is unquestionable that, in the present circumstances of the country, a great deal of the most fertile land is employed more profitably for its owners and occupiers, under perennial herbage, than it could be under our most approved courses of tillage. In what respect the interest of the nation is concerned in this arrangement, this is not the place to inquire.

To give a concise view of the agricultural state of the land in Britain not subjected to aration, we shall offer some observations on *Meadows*, on *Natural Pastures*, and on *Wastes*, in separate sections.

SECT. I. MEADOWS.

Meadows.

By *meadows*, we understand all such land as is kept under grass chiefly for the sake of a hay crop, though occasionally, and at particular seasons of the year, it may be depastured by the domesticated animals; and we usually include under this term the notion of a greater degree of moisture in the soil, than would be thought desirable either for permanent pasture or lands in tillage. Where hay is in great demand, as near large towns, and especially if a good system of cropping be but little understood, a great deal of arable land, indeed, may be seen appropriated to hay crops; but the most valuable meadows are such as are either naturally rather moist, or rendered so by means of irrigation.

Very little meadow in Scotland.

As the alternate and convertible systems of husbandry, before explained, prevail throughout all the lowlands of Scotland, there is little land that deserves the name of meadow; though it is sometimes applied to marshy spots, not worth improving for tillage, which yield a quantity of coarse herbage to be made into hay, and are called *bog* meadows. The only natural hay grounds of much value in Scotland are to be found in the sheep-walks of the southern counties, where one or two small inclosures near the farmer's or shepherd's dwelling-house are commonly reserved for producing hay to feed the flocks during a deep snow; and as there is seldom much land in tillage in such places, the manure made from a few horses and cows is sometimes spread on the surface of these fields, though by no means according to any regular plan. To a very small extent, watered meadows have been tried in Scotland; but, from a general conviction of the superior advantages of cultivating herbage and roots on all soils that can be made to produce them, and probably also owing to the less fertilizing qualities of the waters, even meadows of this kind are not likely ever to become of general importance there. The remarks which we mean to offer on this subject must therefore be understood as applicable to the practice of England only.

Plants.

The indigenous plants of which meadow-grass consists necessarily vary with the qualities of the soil. The most valuable are, the sweet-smelling vernal-grass (*Anthoxanthum odoratum*); perennial ryegrass (*Lolium perenne*); foxtail (*Alopecurus pratensis*); common meadow-grass (*Poa trivialis* and *Poa pratensis*); and soft meadow-grass (*Holcus lanatus*). The *poas* compose the greater part of the celebrated Orcheston meadows near Salisbury, and of the no less productive meadows near Edinburgh.

Time of shutting up meadows.

The period at which stock is excluded from meadows, in order that the grasses may rise for a hay crop, is different, according to the nature of the soil in regard to humidity, and the kind of stock with which the land is depastured. In some instances the cattle are removed in November, while the sheep are continued on the ground till February. (*Middlesex Report*, p. 224.) In other places the meadows are open to all kinds of stock from August to April (*Id.* p. 219), and to sheep even till May. (*Lincolnshire Report*, p. 196.)

Management.

In the judicious management of meadow lands, attention must be paid to prevent the stagnation of water and the growth of aquatic plants, and to extirpate fern, docks, thistles, and other weeds. Moss, in particular, often establishes itself on such lands, to the great injury of the valuable grasses, and can with difficulty be removed, even by the application of calcareous manures. Ant and mole-hills also abound in meadows, and are too often so much neglected as to render a large portion of the surface nearly unproductive. And in these, as in all other hay grounds, the preparatory operations for the scythe should always conclude with the use of a heavy roller.

The most important particulars in the management of meadow lands are, their improvement by irrigation, and by the application of manure. Of IRRIGATION we shall treat in a separate article.

With regard to the time at which manure should be applied, a great difference of opinion prevails among the farmers in England. In the county of Middlesex, where almost all the grass-lands are preserved for hay, the manure is invariably laid on in October (*Middlesex Report*, p. 224), while the land is sufficiently dry to bear the driving of loaded carts without injury, and when the heat of the day is so moderated as not to exhale the volatile parts of the dung. Others prefer applying it immediately after the hay-time, from about the middle of July to the end of August, which is said to be the "good old time;"[1] and if that season be inconvenient, any time from the beginning of February to the beginning of April.[2] It is, however, too common a practice to carry out the manure during frosty weather, when, though the ground is not cut up by the carts, the fertilizing parts of the dung are dissipated and washed away by the snow and rains before they can penetrate the soil.

"There is scarcely any sort of manure that will not be useful when laid on the surface of grass-lands; but in general those of the more rich dung kinds will be the most suitable for the older sorts of sward-land, and dung in composition with fresh vegetable earthy substances the more useful in the new lays or grass-lands."—"In this district it is the practice of the best farmers to prefer the richest dung they can procure, and seldom to mix it with any sort of earthy material, as they find it to answer the best in regard to the quantity of produce, which is the principal object in view; the cultivators depending chiefly on the sale of their hay in the London markets."—"It is the practice to turn over the dung that is brought from London in a tolerable state of rottenness, once chopping it well down in the operation, so as to be in a middling state of fineness when put upon the land. It is necessary, however, that it should be in a more rotten and reduced state when applied in the spring, than when the autumn is chosen for that purpose." (Dickson's *Practical Agriculture*, vol. ii. p. 915.)

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[1] *Com. to Board of Agriculture*, vol. iv. p. 138.

[2] Dickson's *Practical Agriculture*, vol. ii. p. 915.

Experiments.

Some very interesting experiments have been made with different kinds of manure, for the purpose of ascertaining their effects, both in regard to the quantity and quality of the produce on different kinds of land. Fourteen lots, of half an acre of eight yards to the rod each, were thus manured, and the grass was made into hay, all as nearly alike as possible. The greatest weight of hay was taken from the lot manured with horse, cow, and butchers' dung, all mixed together, of each about an equal quantity. It lay in that state about two months, and was then turned over and allowed to lie eight or ten days more, after which it was put on the land before it had done fermenting, and spread immediately. And to ascertain the quality of the produce of the different lots, a small handful from each was laid down on a dry, clean place, where there was little or no grass, and six horses were turned out to them, one after another. In selecting the lots, there seems to have been little difference of taste among the horses; and all of them agreed in rejecting two lots, one of which had been manured with blubber mixed with soil, and the other with soot,—in both instances laid on in the month of April preceding. (*Lancashire Report*, p. 130, *et seq.*)

"The proportion of manure that is necessary must in a great measure depend upon the circumstances of the land, and the facility of procuring it. In this district (near London), where the manure is of a very good and enriching quality, from its being produced in stables and other places where animals are highly fed, the quantity is usually from four or five to six or seven loads on the acre, such as are drawn by three or four horses in their return from town on taking up the hay." (Dickson's *Practical Agriculture*, vol. ii. p. 916.)

Manure is laid on at intervals of time, more or less distant, according to the same circumstances that determine the quantity of it. Though there are some instances of hay-grounds bearing fair crops every year during a length of years without any manure, or any advantage from pasturage, except what the after-grass has afforded,[1] yet in general manure must either be allowed every third or fourth year, or the land depastured one year and mown the other; " or, what is better, depastured two years and mown the third." (*Northumberland Report*, p. 111.) A succession of hay crops, without manure or pasturage, on meadows not irrigated, is justly condemned by all judicious farmers, as a sure means of impoverishing the soil.

Hay-making.

The mode of converting this herbage into hay, being somewhat different from that which has been described in regard to clovers and ryegrass, requires to be mentioned here. The farmers of Middlesex, who supply the metropolis with hay, are understood to manage this department of rural economy in a very perfect manner; and a particular account of their practice is given in the Report by Middleton, to which we refer.

"In the course of hay-making," says this writer, " the grass should, as much as possible, be protected both day and night against rain and dew, by cocking. Care should also be taken to proportion the number of hay-makers to that of the mowers, so that there may not be more grass in hand at any time than can be managed according to the described process. This proportion is about twenty hay-makers (of which number twelve may be women) to four mowers: the latter are sometimes taken half a day to assist the former. But in hot, windy, or very drying weather, a greater proportion of hay-makers will be required than when the weather is cloudy and cool.

"It is particularly necessary to guard against spreading more hay than the number of hands can get into cock the same day, or before rain. In showery and uncertain weather the grass may sometimes be suffered to lie three, four, or even five days in swath. But before it has lain long enough for the under side of the swath to become yellow (which if suffered to lie long would be the case), particular care should be taken to turn the swaths with the heads of the rakes. In this state it will cure so much in about two days as only to require being tedded a few hours, when the weather is fine, previous to its being put together and carried. In this manner hay may be made and stacked at a small expense and of a good colour, but the tops and bottoms of the grass are insufficiently separated by it.

"There are no hay-stacks more neatly formed, or better secured, than those of Middlesex. At every vacant time, while the stack is carrying up, the men are employed in pulling it with their hands into a proper shape; and about a week after it is finished, the whole of it is properly thatched, and then secured from receiving any damage from the wind, by means of a straw-rope extended along the eaves, up the ends, and near the ridge. The ends of the thatch are afterwards cut evenly below the eves of the stack, just of sufficient length for the rain-water to drip quite clear of the hay. When the stack happens to be placed in a situation which may be suspected of being too damp in the winter, a trench of about six or eight inches deep is dug round, and nearly close to it, which serves to convey all the water from the spot, and renders it perfectly dry and secure." (*Middlesex Report*, p. 238–241.)

After-grass.

When the grass has risen again after the hay crop, it is usually depastured, as has been already mentioned when treating of clovers: to mow a second time is considered a bad practice among the best hay farmers. (*Middlesex Report*, p. 249.) But it is the usage of some to leave the after-grass on the ground without being eaten till spring, when it is said to be preferable, for ewes and lambs, to turnips, cabbages, or any other species whatever of what is termed *spring-feed*. This mode of management, which is strongly recommended by Mr Young, and in some cases by Mr Marshall also, is unknown in the north, where, though it is in many cases found beneficial, with a view to an early spring growth, not to eat the pastures too close before winter, it would be attended with a much greater loss of herbage than any advantage in spring could compensate, to leave the after-growth of mown grounds untouched till that season. There has never been found any deficiency of milk with ewes that are tolerably well supplied with turnips a little before and after they drop their lambs.

The weight of the hay produced on meadows well managed, being on an average about one ton and a half per acre, holds out little encouragement to retain good arable land in this condition; and, unless near London and a few other large towns, pasturage would probably give a much more valuable return. In Lincolnshire, where there are some of the richest grazing lands in England, it is observed that all lands that will feed cattle should be mown as little as possible; and nothing pays worse there than the scythe: "it costs as much labour as a crop of corn, and more than in many counties, and is not of half the value." (*Lincolnshire Report*, p. 195.)

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[1] Marshall's *Review of Reports to the Board of Agriculture*, p. 163, *Western Department*.

Sect. II. Pastures.

Permanent pastures.

We have already mentioned, in the preceding chapter, that pasturage for one, two, or more years, is frequently interposed in the course of cropping arable land, to prevent that exhaustion of the soil which is commonly the consequence of incessant tillage crops. The pasture lands to be treated of here are, therefore, such as are retained permanently, or at least for an indefinite period, in this state, merely for the sake of the herbage they yield, and without any particular view to the amelioration of the lands for bearing crops of grain. In this general application of the word, permanent pastures include not only such land as might be cultivated by the plough, but also all those uplands to which tillage operations could not be extended with any prospect of remuneration, such as the far greater part of the hilly and mountainous sheep grounds throughout this kingdom. The nature of these pastures is, however, so different, and the expediency of retaining *arable land* in permanent pasture has been so keenly discussed, that it will be proper to notice the two descriptions separately, under the general though not quite accurate appellations of *feeding* and *hilly* pastures. Under the former we may comprehend all old rich pastures that are capable of *fattening* cattle; and under the second, such as are adapted to *rearing* them only, or are more advantageously depastured by sheep.

1. *Feeding-Pastures.*

Feeding-pastures.

Of these there is a great extent in most of the counties of England, but very few in Scotland, except near the houses of great proprietors; and much useless controversy has been carried on between the farmers of the two countries, about the comparative advantages of preserving such pastures, or of bringing them under a regular system of alternate or convertible husbandry. That much of this land in the south would be more productive, both to the proprietor and occupier, under a good course of cropping than under pasture, it is impossible to deny; but it is no less certain, that there are large tracts of rich grazing land, which, in the present state of the demand for the produce of grass-lands, and of the law of England with regard to tithes, cannot be employed more profitably for the parties concerned than in pasture. The interest which the Board of Agriculture has taken in this question, with a view to an abundant supply of corn for the wants of a rapidly increasing population, seems, therefore, not to have been well directed. Instead of devoting a large portion of their volumes to the instruction of farmers regarding the best method of bringing grass-lands into tillage, and restoring them again to meadow or pasture without deterioration, the first thing required was to attempt removing the almost insuperable obstruction of tithes, by proposing to the legislature an equitable plan of commutation. If some beneficial arrangement were adopted on this head, there is no reason to doubt that individual interest would soon operate the wished-for change; and that all grass-lands capable of yielding more rent and profit under tillage than under pasture would be subjected to the plough as fast as the demands of the population might require.

Different opinions as to management.

Except in regard to those necessary operations that have been already noticed under the former section,—such as the extirpation of weeds and noxious shrubs, clearing away ant and mole-hills, &c.—there are few points respecting the management of this kind of land, on which some difference of opinion does not prevail. The time of stocking,—the number of the animals, and whether they should be all of one or of different species,—the extent of the inclosures,—and the propriety of eating the herbage close, or leaving it always in a rather abundant state,—are all of them questions which it is scarcely possible to decide in a satisfactory manner by the application of general rules. They can only be resolved, with any pretensions to utility, by a reference to the particular circumstances of each case; for the practice of one district, in regard to these and other points, will be found quite inapplicable to others, where the soil and climate, and the purposes to which the pastures are applied, are materially different.

It has been recommended to apply manure to grass-lands, even where, not being used as hay grounds, they afford no means of supply. (Dickson's *Practical Agriculture*, vol. ii. p. 953.) But, excepting the dung dropped by the pasturing animals, which should always be regularly spread from time to time, it may be laid down as a rule of pretty extensive application, that if grass-lands do not preserve their fertility under pasturage, it would be much better to bring them under tillage for a time, than to enrich them at the expense of land-carrying crops of corn.

Teathing.

Another practice, which is scarcely less objectionable, is that of stacking on the field, or carrying to be consumed there during winter the provender that ought to have furnished disposable manure for the use of the farm at large. It is to no purpose that such a wasteful practice is defended, on dry light soils, which are alleged to be thus benefited by the treading of the cattle. (Marshall's *Rural Economy of Yorkshire*, vol. ii. p. 131.) During the frequent and heavy falls of rain and snow in winter, there is scarcely any land so dry as not to be injured by the treading of heavy cattle; and were there any thing gained in this respect by this management, it would be much more than counterbalanced by the loss of a great part of the manure from the same cause. The able writer to whom we have just referred very properly disapproves of carting on manure in winter; and for the same reason,—namely, the loss of it which must necessarily be the consequence,—he ought to have objected to foddering on the land, or *teathing*, at that season. The practice, however, is but too common in those districts, both in South and North Britain, where the knowledge of correct husbandry has made but little progress. It is equally objectionable, whether the fodder be consumed on meadows where it grew, or on other grass-lands. The fodder should in almost every instance be eaten in houses or fold-yards, instead of the dung being dropped irregularly over the surface, or, as must be almost always the case, accumulated in some spots sheltered by trees and hedges, to which the animals necessarily resort during the storms of winter.

Opening pastures in spring.

The time of opening pastures in spring must evidently be earlier or later, according to the climate, and in the same climate according to the season; and the state of growth which it is desirable that the grass should attain before being stocked, must in some degree be determined by the condition and description of the animals to be employed in consuming it,—whether they are only in a growing state, or approaching to fatness,—whether milch cows or sheep, or a mixture of animals of different species. It conveys no very precise idea respecting these points, though the remark itself is just, to say that the herbage should not be allowed to rise so high as to permit the coarser plants to run to seed, and that it is bad management to suffer *store stock* to be turned upon a full bite.

(Marshall's *Yorkshire*, vol. ii. p. 129.) The great objects to be aimed at are, that the stock, of whatever animals it may consist, should be carried forward, faster or slower, according to the purposes of their owner; and that no part of the herbage should be allowed to run to waste, or be unprofitably consumed. But nothing but careful inspection of the land and of the stock, from time to time, can enable any grazier to judge with certainty what are the best measures for attaining these objects.

"*Fatting cattle*," says Mr Marshall, "which are forward in flesh, and are intended to be finished with grass, may require a full bite at first turning out. But for *cows*, *working oxen*, and *rearing cattle*, and lean cattle intended to be fatted on grass, a full bite at the first turning out is not requisite."—"Old Ladyday to the middle of April, according to the progress of spring, appears to me at present as the best time for *shutting up mowing grounds* and *opening pastures*." (Marshall's *Yorkshire*, vol. ii. p. 152-3.)

State of growth when stocked.

In regard to the state of the growth of pastures when first stocked, some distinction should be made between new leys and old close swards. To prevent the destruction of the young plants, whether of clovers or other herbage, on the former description of pasture, which would be the consequence of stocking them too early, especially with sheep, they should be allowed to rise higher than would be necessary in the case of old turf; and to secure their roots from the further injury of a hot summer, it is advisable not to feed them close in the early part of the season, and probably not at any time throughout the whole of the first or second season, if the land is to be continued in pasture. The roots of old and firm sward, on the other hand, are not in so much danger, either from close feeding or from the heats of summer; and they are in much less danger from the frosts and thaws of winter.

Stock.

Another circumstance almost equally indeterminate with the time of opening pastures, is the stock which should be employed, and whether they should be all of one or of different kinds.

With regard to the former, all soils rather moist, and of such a quality, as is the case with rich clays, as to produce herbage suited to the fattening of cattle, will in general be more advantageously stocked with them than with sheep; but there can be no other rule for the total exclusion of sheep than the danger of the rot, nor any other general rule for preferring one kind of stock to another than their comparative profits.

With regard to a mixed stock, the sentiments and practice of the best graziers seem to be in its favour. "It is generally understood that *horses* and *cattle* intermixed will eat grass cleaner than either species will alone, not so much from their separately affecting different grasses, as from the circumstance of both species disliking to feed near their own dung." (Marshall's *Yorkshire*, vol. ii. p. 154.) "Some few graziers follow the old custom of keeping only one kind of stock upon the same ground, whilst others, we think with more propriety, intermix with oxen and cows a few sheep and two or three colts in each pasture, which both turn to good account and do little injury to the grazing cattle. In some cases sheep are a real benefit, by eating down and destroying the *ragwort* (*Senecio jacobæa*), which disgraces some of the best pastures of the county, where *oxen only* are grazed." (*Northumberland Report*, p. 126.) And in Lincolnshire, where grazing is followed to a great extent, and with uncommon success, as well as in most other districts, the practice seems to be, almost invariably, to keep a mixed stock of sheep and cattle on the same pasture (*Lincolnshire Report*, p. 174), in proportions varying with the nature of the soil and the quality of the herbage.

Close and rough feeding.

It is obviously impossible to estimate the number of animals that may be depastured on any given extent of ground, without reference to the particular spot in question; and the same difference exists, with regard to the propriety of feeding close or leaving the pastures rough, that prevails in most other parts of this subject. Though there be loss in stocking too sparingly, the more common and dangerous error is in overstocking, by which the summer's grass is not unfrequently entirely lost. There seems to us, however, to be a season, some time during the year, when grass-lands, particularly old turf, should be eaten very close, not merely for the sake of preventing waste, but also for the purpose of keeping down the coarser kinds of plants, and giving to the pastures as equal and fine a sward as possible. The most proper period must partly depend upon the convenience of the grazier; but it can hardly be either immediately before the drought of summer or the frost of winter. Some time in autumn, when the ardent heat of the season is over, and when there is still time for a new growth before winter, may be most suitable for the land itself, and generally also for the grazier, his fat stock being then mostly disposed of, or carried to the after-grass of mown grounds. The *sweeping* of pastures with the scythe may be employed as a substitute for this close feeding; the waste and labour of which, however, though they be but trifling, it does not seem necessary to incur on rich grazing lands under correct management.

Size of inclosures.

The size of inclosures is a matter of considerable importance on grass-lands, both for the stock itself, and the mode of consuming the produce. In general, pastures best adapted to sheep should be in large fields. The animals are not only impatient of heat, and liable to be much injured by flies, in small pastures often surrounded by trees and high hedges, but they are naturally, with the exception perhaps of the Leicester variety, much more restless and easily disturbed than the other species of live stock. "Sheep," says a well-known writer, "love a wider range, and ought to have it, because they delight in short grass: give them eighty or ninety acres, and any fence will keep them in; confine them to a field of seven or eight acres, and it must be a very strong fence that keeps them in." (Kames's *Gentleman Farmer*, p. 203.) Though fields so large as 80 or 90 acres can be advisable only in hilly districts, yet the general rule is nevertheless consistent with experience in regard to all our least domesticated varieties.

The size of fields deserves attention on another account; for there are strong reasons for preferring pasture land in two or more inclosures, to the same extent in one large field. Besides the advantages of shelter, both to the animals and the herbage, such subdivisions enable the grazier either to separate his stock into small parcels, by which means they feed more at their ease, or to give the best pastures to that portion of them which he wishes to come earliest to market. The advantages of moderate-sized inclosures are well known in the best grazing counties; but the subdivisions are in some instances much more minute than is consistent with the value of the ground occupied with fences, or necessary to the improvement of the stock.

Succession of stocks.

"In all cases," says Marshall, "where fatting cattle or dairy cows make a part of the stock, and where situation, soil, and water will permit, every suite of grazing grounds ought, in my idea, to consist of *three compartments*; one for *head* stock (as cows or fatting cattle), one for *followers* (as rearing or other lean stock), and the third to be shut up to freshen, for the *leading* stock." (Marshall's *Yorkshire*, vol. ii. p. 158.)

It is sufficiently obvious that every inclosure of pasture land should be provided with abundance of water at all times, though this is in some districts a matter of considerable difficulty. Mr Marshall has given a full account of the method of forming drinking pools in Yorkshire, but our limits oblige us to refer the reader to his work.

Transplanting turf.

A practice has been introduced into Norfolk within these few years, the object of which is to obtain a rich turf, with all the valuable qualities of old pasture, much sooner than from seeds alone. This is called *transplanting turf*, or *inoculating land with grass*. A field of good old grass-land is stripped of part of its turf, which is cut into pieces of about three inches square, and placed in its new situation, about six inches apart, on land previously prepared to receive it. In this way one acre of turf will plant nine acres; but it is only a part of the old pasture that is taken off, and this is done in such a manner as not materially to injure it. After being thus planted, the roots are pressed down by means of heavy rollers, which cause them to spread along the ground instead of rising up in tufts; and in a summer or two, during which this transplanted pasture should be very lightly if at all fed upon, the grasses shed their seeds and fill up the interstices, the whole being then formed into a compact and uniform turf. (Blaikie *on the Conversion of Arable Land into Pasture.*) Later writers, particularly Sinclair, the author of *Hortus Gramineus Woburnensis*, think this practice has excited notice only by its novelty, and that it never can become of extensive utility.

2. *Hilly Pastures.*

Hill pastures.

These include such low hills as produce fine short herbage, and are with much advantage kept constantly in pasture, though they are not altogether inaccessible to the plough; as well as such tracts as, from their acclivity and elevation, must necessarily be exclusively appropriated to live stock. The former description of grass-lands, though different from the feeding pastures, of which we have just treated, in respect of their being less convenient for tillage management, are nevertheless in other circumstances so nearly similar as not to require any separate discussion. These low hills are for the most part occupied with sheep, a very few cattle being sometimes depastured towards their bases; and they frequently comprise herbage sufficiently rich for fattening sheep, together with coarser pastures for breeding and rearing them. In many instances, a small part of such tracts is cultivated chiefly for providing green crops for the sheep in winter; but corn is quite a subordinate object, and extensive aration is seldom attempted, except for the purpose of laying down the land to grass in an improved condition.

Improperly called wastes.

The more elevated pastures, from which the plough is altogether excluded, have been commonly classed among waste lands,—even such of them as bear herbage by no means of inconsiderable value,—as well as heaths and moors, with patches of which the green pastures are often chequered. The general term *wastes* is therefore a very indefinite expression, and indeed is not unfrequently made to comprehend all that extensive division of our territory that neither produces corn nor rich herbage. Yet it is on such tracts that by far the greater part of our butcher-meat and wool is grown, and not a little of the former fully prepared for the market. Foreigners and superficial readers at home must accordingly be greatly mistaken if they imagine that what are called *wastes* by the Board of Agriculture, and other writers on rural economy, are really altogether unproductive; and it would be a still grosser error to believe that these wastes owe their continuance to neglect or mismanagement, and that any exertions of human industry can ever render the greater part of them, including all the mountainous tracts of Great Britain, more valuable than they are at present, without a much greater expenditure of capital than, under almost any circumstances, they could possibly return. Yet as this vague general term has been established by use, we shall bring together, in the following section, a few observations on the present condition of that part of our territory which is still almost in a state of nature, and the improvements of which it is susceptible.

SECT. III. WASTES.

Division of Wastes.

That part of Britain which is still in a state of waste might be treated of under a number of heads, corresponding to the various causes of its infertility. Land is comparatively unproductive, owing, 1*st*. to the surface being covered with stones, or occupied with worthless shrubs and other plants; 2*dly*, to the superabundance of water, as in the case of mosses and marshes; 3*dly*, to an original defect in the soil, as in loose sands, moors, and compact sterile clays, sometimes called *till;* 4*thly*, to the elevation and ruggedness of the surface, and the ungenial character of the climate, as in our mountainous districts; 5*thly*, to the previous exhaustion of the vegetable matter of the soil by injudicious cropping; and, 6*thly*, to the mode of tenure and occupancy, as in commons.

Considerations as to their improvement.

It is matter of regret that the subject of wastes has not yet been treated in that distinct and scientific manner which its importance deserves. It would be advisable to have it ascertained what portion of these divisions, or of others under which our wastes may be arranged, is capable of improvement, and how far such improvement is eligible, on a fair estimate of the cost, and the probable increase of produce. It should also be considered, as far as precision is attainable on such points, how much farther a proprietor might advantageously proceed in the expenditure of capital, than one who is merely a temporary occupier. For it is evident that an improvement will be sufficiently profitable to the former if he draws for his outlay 4 or 5 per cent. yearly; whereas a tenant, holding on a lease of 20 years, must have an annuity for that period of at least three times the amount, in order that his capital may be returned, with the ordinary profits of trade, before its expiration.

The delusive prospects of profit from the improvement of wastes, held out by speculative men, have an unhappy tendency to produce disappointment in rash and sanguine adventurers, and ultimately to discourage such attempts as, with judicious attention to economy, would in all probability be attended with great success. Those who are conversant with the publications that have lately appeared on this subject, must be aware with what caution the alleged results of most of these writers ought to be examined, and how different has been the experience of those who have ventured to put their schemes in practice, from what they had been led to anticipate.

There are few soils, however, so unfertile, and few tracts of any extent so destitute of soil, as not to be susceptible of profitable improvement, if the climate be not altogether hostile to vegetation, or the surface so steep or so rugged as not to admit of any other operations than such as must be executed by manual labour. With this exception, and the exception probably of what is called *flow* moss,—that *innabilis unda*, on which there is reason to fear much capital has been employed to little purpose,—wastes are certainly capable of considerable improvement, by surface or underdraining; by top-dressing with calcareous manures; by paring and burning as a preparation for tillage; by trenching, irrigation, and embankment.

We shall offer a few remarks on this subject, in the order first above mentioned.

Land covered with stones.

1. When the surface of ground is much covered with stones, it is material to consider not only the expense which will attend the clearing of it, but whether the soil and climate be such as to remunerate the cultivator after it has been brought into a state of tillage, and to what purpose the stones themselves may be applied. When the stones that project from the surface are a part of the rock continued beneath the soil, it may be doubted whether, instead of incurring the expense of working away the rock to such a depth as would allow the plough to pass over it, it may not be advisable to let the land remain in pasture, and improve it by top-dressings.

Very large blocks of stone are cleared away by means of gunpowder; but if this is not necessary, they are raised by levers, and rolled upon a sledge, or by the use of a block and tackle attached to a triangle. In the latter case, a hole is bored into the stone, and an iron bolt with an eye driven into it; and this, though apparently incapable of bearing any great weight, serves to raise the stone in a perpendicular direction, until it can be deposited upon a cart or sledge placed below it, to be carried off the field.

Trenching.

As soon as the stones are removed, the holes must of course be filled up, and the surface rendered tolerably level. The best method of doing this is by trenching, which answers the further purpose of deepening the soil, and removing any remaining obstacle within the reach of the plough.

"The greater part of the land in the vicinity of Aberdeen," says the author of the Report of that county, "has, from the most barren and unproductive state, been thoroughly improved by *trenching*. Not less than 3000 acres have been trenched within three miles of Aberdeen; and in all places of the county considerable additions have been made to the arable, by trenching the barren lands."

"It is practised in barren land, which abounds in stones of different dimensions, sometimes, where the soil is dry, and in other cases, where it is wet, united with draining: it is practised when the object is to deepen the soil, or to mix a portion of the subsoil along with it: it is practised when the subsoil is tilly or very tenacious, as well as when that next the surface is unproductive, moory, or exhausted by overcropping: and, lastly, it is practised when the land is foul, and when stronger or cleaner soil can be brought up to the surface.

"The expense indeed could not have been borne in many cases, if the first crop (for so it may be called, as it covered the whole soil) that was raised by the spade and mattock had not produced from L.30 to L.50 per acre. This was a crop of granite stones, which was sold for paving the streets of London. But, after all, the ground that was thus gained to the community would not have been able to recompense the cultivator, if a mixture of the spade and plough husbandry had not been introduced. The rent of the land in the immediate vicinity of Aberdeen is extremely high, being now, on a lease for years, from L.5 to L.10 per acre, and in a few cases not less than L.18; nay, when let for a single crop, sometimes as high as L.20. Yet all this is necessary to remunerate the improver, who trenched, dunged, limed, and cultivated this thin soil, which must be frequently manured. It would have yielded too little produce, if tilled only by the plough; and would have been cultivated at too great an expense, if the soil had been constantly digged by the spade. A medium between these two, viz. either the alternate use of the plough and spade, or at least a mixture of plough and spade husbandry, was thus introduced by necessity, and has been attended with the happiest effects." (*Aberdeenshire Report.*)

Mosses and marshes.

2. In the case of mosses and marshes, the first thing is to get rid of the superabundance of water, by opening a main drain, into which such smaller ones as may be necessary will discharge themselves. On the subject of improving moss land a great deal has been written within these few years, and many experiments made with very different results. In favourable circumstances, if the operation is carefully and economically conducted, there can be no doubt that land of this description may be improved with ultimate benefit to the undertaker. But the great object ought to be, not (at least for some years at first) to convert the land into tillage, but merely to render it productive in the state of meadow or pasture. With this view, the first operation after draining should be to get rid of the heath and coarse herbage on the surface, by burning, levelling it where necessary at the same time, and then to top-dress with calcareous matter, either by itself or mixed up in compost with earth and other substances, as a preparation for grass-seeds. If it be necessary to turn over the whole surface, this in many cases may be done as cheaply by the spade as by the plough, and to much better purpose. Timothy (*phleum pratense*) will be found one of the most valuable grasses on such a soil; but if the surface be sufficiently saturated with calcareous matter, and not too wet, clovers, particularly white clover, and the grasses usually sown upon arable land, may be used with advantage. The after-management must of course depend upon circumstances. Frequent rolling must always be of use in compressing a soil which is naturally spongy; thus preventing the roots of the plants from being thrown out of the ground: and we should think that in general it must be better to retain such land for some years in the state of meadow, top-dressing it occasionally, than even in pasturage.

Among the various attempts that have been made upon a large scale to reclaim moss land, we shall mention two that seem worthy of particular notice.

Floating off moss.

The first cannot be considered as an improvement of the mossy soil itself. On the contrary, the improvement consists in getting rid of it altogether. The practice may be shortly described as follows:—

"A stream of water is carried first upon the spongy upper stratum of moss, which is by this means conveyed away to the neighbouring frith or arm of the sea, the light moss being thrown into a ditch, made as the temporary bed of this artificial rivulet. The upper part, or spongy moss, is thus carried off by successive ditches, to the extent of 30 or 40 yards broad; then a second deeper ditch is cut into the clay or bottom of the flat stratum of the heavy moss, and a number of parallel ditches are made for admitting the rivulet, into which the remaining moss is thrown, till nearly the whole is carried off, excepting a thin stratum, consisting partly of black peat-earth, and partly of decayed wood found in the moss, which is burnt for manure to the carse soil about to be cultivated. Much ingenuity has been shown in constructing machinery to supply water for removing the moss, previous to the improvement of the carse or rich soil below. For some years after being thus cleared both of peat-moss and the remains of wood, successive crops of oats were formerly too often repeated; but this was found to be injurious, and a more regular mode of cropping is now introduced.

Kincardine moss.

"In 1766, the late Lord Kames became proprietor of the estate of Blair-Drummond, in the county of Perth, where he resolved to carry on with spirit this mode of improvement on the moss of Kincardine. After trying several experiments, he at last adopted the plan of giving profitable leases to small occupiers of land, to induce them to remove the moss; and before his death in 1782, no less a number than 336 acres were cleared of moss, and brought into cultivation. His son and successor pursuing the same plan, got 440 acres more let in three years, to which additions were made periodically. In 1792 the population had increased to 764 souls, who cultivated 444 acres. By a survey in 1805, 577 acres were cleared, including 12 acres occupied by roads. In 1814 considerably above 800 acres were cleared, and the population amounted to upwards of 900 souls.

"Thus an extensive tract of country, where formerly only a few snipes and muirfowl could find subsistence, has been converted, as if by magic, into a rich and fertile carse of alluvial soil, worth from L.3 to L.5 per acre."

Mr Roscoe's improvements on Chat moss.

The other instance is that of the improvement of Chat moss in the county of Lancaster, by Mr Roscoe of Liverpool. The length of this moss is about six miles, its greatest breadth about three miles, and its depth may be estimated at from 10 to upwards of 30 feet. It is entirely composed of the substance well known by the name of peat, being an aggregate of vegetable matter, disorganized and inert, but preserved by certain causes from putrefaction. On the surface it is light and fibrous, but becomes more dense below. On cutting to a considerable depth, it is found to be black, compact, and heavy, and in many respects resembling coal. There is not throughout the whole moss the least intermixture of sand, gravel, or other material, the entire substance being a pure vegetable.

It is now upwards of 20 years since Mr Roscoe, in company with Mr Wakefield, began to improve Trafford moss, a tract of 300 acres, lying two miles east of Chat moss; and his operations on it seem to have been so successful as to encourage him to proceed with Chat moss. But in the improvement of the latter, he found it unnecessary to incur so heavy an expense for drainage. From observing that, where the moss had been dug for peat, the water had drawn towards it from a distance of 50 to 100 yards, he conceived that if each drain had to draw the water only 25 yards, they would, within a reasonable time, undoubtedly answer the purpose. The whole of the moss was therefore laid out on the following plan.

Drainage.

"I first carried a main road," says Mr Roscoe, in a recent communication to the Board of Agriculture, "nearly from east to west, through the whole extent of my portion of the moss. This road is about three miles long and 36 feet wide. It is bounded on each side by a main drain, seven feet wide and six feet deep, from which the water is conveyed, by a considerable fall, to the river. From these two main drains other drains diverge, at 50 yards distance from each other, and extend from each side of the road to the utmost limits of the moss. Thus each field contains 50 yards in front to the road, and is of an indefinite length, according as the boundary of the moss varies. These field-drains are four feet wide at the top, one foot at the bottom, and four feet and a half deep. They are kept carefully open, and, as far as my experience hitherto goes, I believe they will sufficiently drain the moss, without having recourse to underdraining, which I have never made use of at Chat moss, except in a very few instances, where, from the lowness of the surface, the water could not readily be gotten off without open channels, which might obstruct the plough."

Cultivation.

The cultivation of the moss then proceeds in the following manner. "After setting fire to the heath and herbage on the moss, and burning it down as far as practicable, I plough a thin sod or furrow with a very sharp horse-plough, which I burn in small heaps, and dissipate; considering it of little use but to destroy the tough sods of the *Eriophora*, *Nardus stricta*, and other plants, whose matted roots are almost imperishable. The moss being thus brought to a tolerably dry and level surface, I then plough it in a regular furrow six inches deep; and as soon as possible after it is thus turned up, I set upon it the necessary quantity of marl, not less than 200 cubic yards to the acre. As the marl begins to crumble and fall with the sun or frost, it is spread over the land with considerable exactness; after which I put in a crop as early as possible, sometimes by the plough, and at others with the horse-scuffle or scarifier, according to the nature of the crop; adding, for the first crop, a quantity of manure, which I bring down the navigable river Irwell to the borders of the moss, setting on about 20 tons to the acre. Moss land thus treated may not only be advantageously cropped *the first year* with green crops, as potatoes, turnips, &c. but with any kind of grain; and as wheat has of late paid better to the farmer than any other, I have hitherto chiefly relied upon it, as my first crop, for reimbursing the expense."

Manures.

Expense and produce.

The expense of the several ploughings, with the burning, sowing, and harrowing, and of the marl and manure, but exclusive of the seed, and also of the previous drainage and general charges, amounts to L.18. 5s. per acre; and in 1812, on one piece of land thus improved, Mr Roscoe had 20 bushels of wheat, then worth a guinea per bushel, and on another piece 18 bushels; but these were the best crops upon the moss.

"Both lime and marl are generally to be found within a reasonable distance; and the preference given to either of them will much depend upon the facility of obtaining it. The quantity of lime necessary for the purpose is so small in proportion to that of marl, that, where the distance is great, and the carriage high, it is more advisable to make use of it; but where marl is upon the spot, or can be obtained in sufficient quantity at a reasonable expense, it appears to be preferable." Mr Roscoe is thoroughly convinced, after a great many different trials, that all temporizing expedients are fallacious; and that "the best method of improving moss land is *by the application of a calcareous substance, in a sufficient quantity to convert the moss into a soil, and by the occasional use of animal or other extraneous manures*, such as the course of cultivation and the nature of the crops may be found to require."

There seems to be little more that is peculiar to himself in Mr Roscoe's operations and course of cropping, except his contrivance for setting on the marl. It would not be practicable, he observes, to effect the marling at so cheap a rate (L.10 per acre), were it not for the assistance of an iron road or railway laid upon boards or sleepers, and movable at pleasure. Along this road the marl is conveyed in waggons with small iron wheels, each drawn by one man. These waggons, by taking out a pin, turn their lading out on either side: they carry about 15 cwts. each, being as much as could heretofore be conveyed over the moss by a cart with a driver and two horses.

Railway.

Progress of Mr Roscoe's improvements.

In the month of November 1805, Mr Roscoe began the drainage by cutting out the main drains on each side of the road, throwing out the moss from the drains into the middle of the road. In 1807 the smaller drains, at 50 yards distance from each other, were begun, and about 1000 acres laid out in the manner already mentioned. In 1808 part of the moss was sufficiently consolidated to be worked with horses in pattens: this year a farm-house, with out-buildings, cottages, &c. was erected, and marl was set upon the land prepared for that purpose. About 20 acres were cropped with turnips and potatoes in 1809; and in the year following, upwards of 80 acres, of which 20 were wheat. In 1811 Mr Roscoe had 100 acres in crop, chiefly in wheat; and in 1812 marl and street manure were applied in the quantities specified above. The crops were wheat and beans, which much surpassed those of any preceding year. "In the course of the present year (1813) I shall have brought into cultivation about 160 acres, which will be cropped with wheat, oats, potatoes, and beans. A tract of 30 acres of clover appears to be very promising."

Improved parts laid into meadow.

The depreciation of agricultural produce in 1815, and the difficulty of combining a regular course of cropping with the bringing in of additional waste land, induced Mr Roscoe to lay down the whole of the improved part of Chat moss into meadow land. So long as land of this description continues productive in the state of meadow or pasture, it does not appear advisable to attempt any course of cropping whatever; and to lay it down for either of these purposes ought perhaps to form the chief inducement to its improvement.

Soils of a hard texture. Blowing sands.

3. A third cause of sterility is found in the natural texture of the soil, as in loose sands and coarse impermeable clays. Moving or blowing sands occur on the sea-coast of many parts of Scotland, and are not only worthless themselves, but frequently inflict serious injury on the lands within their reach, over which the sand spreads itself. This is a matter to which the Highland Society of Scotland have very properly turned their attention; and we shall extract from their communications some account of an attempt that has been recently made to fix these sands, and to render them in some measure productive.

Experiment in reclaiming them.

The experiment to which we allude was made in 1819 and 1820, on a farm in the parish of Harris, and county of Inverness, by the proprietor, Alexander N. Macleod, Esq., "who has completely succeeded in reclaiming and bringing into useful permanent pasture above 100 Scotch acres of useless blowing sand, by planting in it sea-bent (*Arundo arenaria*), known in the Hebrides by the name of bent-grass, and sowing rape-seed on it in a small proportion. The rape-seed requiring to be covered with sea-weed or some other manure immediately after sowing, is not considered so beneficial as the grass, as this requires no manure, or any other cultivation or top-dressing whatever, after being properly planted.

"The operations commenced upon the above farm in the month of September 1819, by cutting the Arundo arenaria or bent-grass about two inches below the surface, with a small thin-edged spade with a short handle, which a man can use in his right hand, at the same time taking hold of the grass in his left; other persons carrying it to the blowing sand, to be planted in a hole, or rather a cut made in the sand, about eight or nine inches deep (and deeper where the sand is very open and much exposed), by a large narrow-pointed spade. A handful of Arundo arenaria or bent-grass was put into each of these cuts, which were about twelve inches distant, more or less according to the exposure of the situation. When properly fixed in the blowing sand, the roots begin to grow, and spread under the surface, in the course of a month after planting.

"When Mr Macleod commenced the operations in reclaiming the tract of ground alluded to, it was altogether covered with blowing sand in winter and spring, and nearly so in summer. A great part of it consisted of high banks of sand, which did not produce grass or verdure of any kind whatever.

"The Arundo arenaria or bent-grass is relished by cattle in summer, but it is of greater value by preserving it on the ground for wintering cattle. It would be injudicious to cut it, because it will stand the winter better than any other grass, and is seldom covered with snow. Neither wind, rain, nor frost will destroy it; but the old grass naturally decays towards the latter end of spring and the beginning of summer, as the new crop grows.

"White and red clover will grow spontaneously among this grass in the course of a few years, provided it is well secured. It will produce seed in some instances within twelve months after planting; but the seed does not, on high exposed situations, come to the maturity that seed requires for sowing. On this account, to propagate this grass from the root is considered preferable to sowing.

"The Arundo arenaria or bent-grass operations should not commence in any season earlier than about the 20th October, and should be given up about the beginning of March, as this planting thrives much better in the wet season."

Coarse clays.

The other descriptions of soil, which owing to their texture are of little value in their natural state, are close, compact clays, imbedded with small stones, and incumbent upon subsoils which do not allow the water to escape. Such land is in general covered with stunted heath and other coarse plants, and to the other causes of its infertility is often added a bad climate. The object in this case, as in the former, should generally be to obtain better herbage, rather than to convert it into arable land.

Paring and burning.

One of the most common and effectual practices in improving this description of land is *paring* and *burning*; a practice which, in the case of old swards matted with the roots of coarse herbage and heath, is acknowledged, both by scientific and practical writers, to be highly advantageous as the next step to be taken after drainage. "The process of burning," says Sir Humphry Davy, "renders the soil less compact, less tenacious and retentive of moisture; and, properly applied, may convert a matter that was stiff, damp, and in consequence cold, into one powdery, dry, and warm, and much more proper as a bed for vegetable life.

"The great objection made by speculative chemists to paring and burning is, that it destroys vegetable and animal matter, or the manure in the soil; but in cases in which the texture of its earthy ingredients is permanently improved, there is more than a compensation for this temporary disadvantage. And in some soils, where there is an excess of inert vegetable matter, the destruction of it must be beneficial; and the carbonaceous matter remaining in the ashes may be more useful to the crop than the vegetable fibre from which it was produced.

"Many obscure causes have been referred to for the purpose of explaining the effects of paring and burning; but I believe they may be referred entirely to the diminution of the coherence and tenacity of clays, and to the destruction of inert and useless vegetable matter, and its conversion into a manure.

For what lands proper.

"All soils that contain too much dead vegetable fibre, and which consequently lose from one-third to one-half of their weight by incineration, and all such as contain their earthy constituents in an impalpable state of division, *i. e.* the stiff clays and marls, are improved by burning; but in coarse sands, or rich soils containing a just mixture of the earths, and in all cases in which the texture is already sufficiently loose, or the organizable matter sufficiently soluble, the process of torrefaction cannot be useful.

"All poor silicious sands must be injured by it; and practice is found to accord with theory. Mr Young, in his Essay on manures, states, 'that he found burning injure sand;' and the operation is never performed by good agriculturists upon silicious sandy soils, after they have once been brought into cultivation." (*Agricultural Chemistry*, p. 346.)

Some eminent cultivators, however, prefer using the plough at the very first. They begin with a wide, shallow furrow, laying over the surface as flat as possible; and in that state it remains to rot for fifteen or eighteen months. It is then cross-ploughed, usually about midsummer, and well harrowed; dressed with lime, ridged up, and sown with rye or oats the following spring. As soon as the crop is removed, it is ploughed for turnips, to which dung is applied; and the turnips being eaten on the ground by sheep, it is laid to grass the year after, the seeds being sown along with oats or barley.

This mode of management, however, can only be adopted on lands of rather a loose texture, suited to turnip. On more compact soils, we should think paring and burning, followed by top-dressings of lime and compost, a preferable practice. But if it be thought expedient to turn over the turf or sod with the plough, a great number of ploughings and harrowings must be required to destroy the roots and pulverize the soil sufficiently; and two summers at least will be necessary to complete the operation. When it is thus brought into a state to be sown with grass-seeds, lime should be freely applied after the last ploughing, and well harrowed in; and then the grass-seeds sown with or without a corn crop. Wherever the object is pasture, a comparatively small quantity of lime will produce the desired effect, if it be kept on the surface instead of being turned down by the plough. It is unnecessary to mention, that on soils of this description, tenacious of moisture, open trenches will be necessary, to prevent any water from stagnating, the furrows also being made so deep as to draw off and discharge any excess of moisture in the soil itself. This kind of land is evidently better suited to pasturage than to meadow, and the pasture may be kept from deterioration by repeated top-dressings.

Mountainous tracts.

4. Much of our mountainous districts is necessarily left in a comparatively unproductive state, from the elevation and ruggedness of the surface, and ungenial character of the climate; but such tracts present so great a variety in their circumstances, that it would be idle to attempt laying down any rules of general application. The leading improvement, we conceive, must be in carrying off the surface-water in open drains, and providing shelter by means of plantations.

Land rendered barren by severe cropping.

5. A soil not naturally unproductive has in many cases been rendered sterile, at least for a time, by injudicious management. When lime and other calcareous manures were first applied to fresh soils, the corn crops produced were often so valuable as to lead to their repetition year after year, without the intervention of ameliorating crops or the application of manures. We have known three successive crops of wheat taken from the same land, and of corn altogether not less than ten crops in as many years. Under this management the soil could not fail to be reduced to a state of barrenness and waste, of which there are still too many instances in many parts of Scotland. The appropriate remedy here is the use of enriching manures, and after a time lime or other calcareous matters may be added. Such land has not only been robbed of its nutritive powers, but the very texture of the soil itself has experienced an unfavourable change. A few years' pasturage must always be useful on land that has undergone so severe a course of tillage.

Commons and common fields.

6. Much of the commons and common lands throughout the country may be considered as retained in a state of comparative waste, by reason of their tenure and mode of occupancy. In Scotland there is now very little land in this state, the law affording a ready means of dividing it, with a few exceptions, among the proprietors or occupants, according to their respective rights and interests. It is otherwise, however, in England, where a special act of parliament seems to be necessary in almost every instance; and though much has been done there in the way of allocating and improving such land under the authority of inclosure acts, much still remains to be done. But the improvement of such land is not so much an agricultural as a political question. When once it is brought into the state of private property, the methods to be adopted for rendering it more productive will necessarily depend upon the nature of the soil and other circumstances.

CHAP. III.

LIVE STOCK.

In the observations which we have to offer on this grand department of husbandry, which in some quarters of the island enjoys a decided preference over tillage, we shall treat, 1. Of Horses; 2. Of Cattle; 3. Of Sheep; 4. Of Swine; and, 5. Of Miscellaneous Stock.

Sect. I. Horses.

Horses.

The form of a horse peculiarly adapted to the labours of agriculture, has been well described by a writer of great experience, in the following words:—

Form.

"His head should be as small as the proportion of the animal will admit; his nostrils expanded, and muzzle fine; his eyes cheerful and prominent; his ears small, upright, and placed near together; his neck, rising out from between his shoulders with an easy tapering curve, must join gracefully to the head; his shoulders, being well thrown back, must also go into his neck (at what is called the points) unperceived, which, perhaps, facilitates the going much more than the narrow shoulder; the arm or fore thigh should be muscular, and, tapering from the shoulder, meet with a fine, straight, sinewy, bony leg; the hoof circular, and wide at the heel; his chest deep, and full at the girth; his loin or fillets broad and straight, and body round; his hips or hooks by no means wide, but quarters long, and tail set on so as to be nearly in the same right line as his back; his thighs strong and muscular; his legs clean and fine-boned; his leg-bones not round, but what is called lathy or flat." (Culley *on Live Stock*, p. 21.)

1. *Breeds.*

Blacks.

1. The *black cart-horse*, bred in the midland counties of England (see Plate XII.), is better suited for drays and waggons than for the common operations of a farm. The present system of farming requires horses of more mettle and activity, better adapted for travelling, and more capable of enduring fatigue, than those heavy, sluggish animals. This variety is understood to have been formed, or at least brought to its present state, by means of stallions and mares imported from the Low Countries; though there appears to be some difference in the accounts that have been preserved, in regard to the places whence they were brought, and the persons who introduced them.[1] "The breed of grey rats," says Mr Marshall, "with which this island has of late years been overrun, is not a greater pest in it than the breed of black fen horses; at least while cattle remain scarce, as they are at present, and

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[1] See Culley *on Live Stock*, p. 32; and Marshall's *Economy of the Midland Counties*, vol. i. p. 306.

while the flesh of horses continues to be rejected as an article of human food." (Marshall's *Yorkshire*, vol. ii. p. 164.) The present improved subvariety of this breed is said to have taken its rise in six Zealand mares, sent over from the Hague by Lord Chesterfield, during his embassy at that court.

Cleveland bays.

2. The *Cleveland bays*, which owe some of their most valuable properties to crosses with the race-horse, have been long celebrated as one of the best breeds in the island; but they are said to have degenerated of late. They are reared to a great extent in Yorkshire, the farmers of which county are remarkable for their knowledge in every thing that relates to this species of live stock. In activity and hardiness these horses have perhaps no superior. Some capital hunters have been produced by putting full-bred stallions to mares of this sort; but the chief object latterly has been to breed coach-horses, and such as have sufficient strength for a two-horse plough. Three of these horses carry a ton and a half of coals, travelling sixty miles in twenty-four hours, without any other rest than two or three baits upon the road; and they frequently perform this labour four times a week.

Suffolk Punch.

3. A third variety is the *Suffolk Punch*, a very useful animal for rural labour. Their merit seems to consist more in constitutional hardiness than true shape. See Plate XII. "Their colour is mostly yellowish or sorrel, with a white ratch or blaze on their faces; the head large, ears wide, muzzle coarse, fore-end low, back long, but very straight, sides flat, shoulders too far forward, hind quarters middling, but rather high about the hips, legs round and short in the pasterns, deep-bellied, and full in the flank; here, perhaps, lies much of the merit of these horses; for we know, from observation and experience, that all deep-bellied horses carry their food long, and consequently are enabled to stand longer and harder days' works. However, certain it is that these horses do perform surprising days' works. It is well known that the Suffolk and Norfolk farmers plough more land in a day than any other people in the island; and these are the kind of horses everywhere used in those districts." (Culley on *Live Stock*, p. 27.)

Clydesdale.

4. The *Clydesdale* horse has been long in high repute in Scotland and the north of England, and, for the purposes of the farmer, is probably equal to any other breed in Britain. Of the origin of this race various accounts have been given, but none of them so clear or so well authenticated as to merit any notice. They have got this name, not because they are bred only in Clydesdale or Lanarkshire,—for the same description of horses are reared in the other western counties of Scotland, and over all that tract which lies between the Clyde and the Forth,—but because the principal markets at which they are sold, Lanark, Carnwath, Rutherglen, and Glasgow, are situated in that district, where they are also preserved in a state of greater purity than in most other parts. They are rather larger than the Suffolk Punches, and the neck is somewhat longer; their colour is black, brown, or grey, and a white spot on the face is esteemed a mark of beauty. The breast is broad; shoulder thick, the blades nearly as high as the chine, and not so much thrown backwards as in road-horses; the hoof round, usually of a black colour, and the heels wide; the back straight and broad, but not too long; the hucks visible, but not prominent, and the space between them and the ribs short; the tail heavy, and well haired, the thighs meeting each other so near as to leave only a small groove for the tail to rest on. One most valuable property of this breed is, that they are remarkably true pullers, a restive horse being rarely found among them. See Plate XIII.

Welsh.

5. The *Welsh* horse bears a near resemblance, in point of size and hardiness, to the best of the native breed of the Highlands of Scotland, and other hilly countries in the north of Europe. It is too small for the present two-horse ploughs, but few horses are equal to them for enduring fatigue on the road. "I well remember one," says Mr Culley, "that I rode for many years, which, to the last, would have gone upon a pavement by choice, in preference to a softer road." (*Observations on Live Stock*, p. 35.)

Galloways.

6. A little horse, of much the same size with the former, or rather larger, called a *Galloway*, from its being found chiefly in that province of Scotland, has now become very rare; the breed having been neglected, from its unfitness for the present labours of agriculture. The true Galloways are said to resemble the Spanish horses; and there is a tradition, that some of the latter, that had escaped from one of the vessels of the Armada, wrecked on the coast of Galloway, were allowed to intermix with the native race. Such of this breed as have been preserved in any degree of purity are of a light bay or brown colour, with black legs, and are easily distinguished by the smallness of their head and neck, and the cleanness of their bone.

Highland ponies.

7. The still smaller horses of the Highlands and Isles of Scotland are distinguished from larger breeds by the several appellations of *Ponies*, *Shelties*, and, in Gaelic, of *Garrons* or *Gearrons*. They are reared in great numbers in the Hebrides, or Western Isles, where they are found in the greatest purity. Different varieties of the same race are spread over all the Highland district and the Northern Isles. This ancient breed is supposed to have been introduced into Scotland from Scandinavia, when the Norwegians and Danes first obtained a footing in these parts. "It is precisely the same breed that subsists at present in Norway, the Feroe Isles, and Iceland, and is totally distinct from every thing of horse kind on the continent of Europe south of the Baltic. In confirmation of this, there is one peculiar variety of the horse in the Highlands that deserves to be noticed. It is there called the *eel-backed* horse. (See Plate XIII.) He is of different colours, light bay, dun, and sometimes cream-coloured; but has always a blackish list that runs along the ridge of the back, from the shoulder to the rump, which has a resemblance to an eel stretched out. This very singular character subsists also in many of the horses of Norway, and is nowhere else known." (Walker's *Hebrides*, vol. ii. p. 158.)

"The Highland horse is sometimes only nine, and seldom twelve hands high, excepting in some of the southern of the Hebrides, where the size has been raised to thirteen or fourteen hands by selection and better feeding. The best of this breed are handsomely shaped, have small legs, large manes, little neat heads, and are extremely active and hardy. The common colours are grey, bay, and black; the last is the favourite one." (*General Report of Scotland*, vol. iii. p. 176.)

2. *Breeding and Rearing.*

The same attention to select the best males and females for breeding, which has been productive of the most advantageous results in the case of cattle and sheep, does not prevail very generally in the breeding of farm-horses: on the contrary, though every one exercises some degree of judgment in regard to the stallion, there are few breeders, comparatively, who hesitate to employ very ill-formed and worthless mares,—and often solely because they are unfit for any thing else than bringing a foal. All the best writers on Agriculture reprobate this absurd and unprofitable practice. "In the midland counties of England the breeding of *cart-horses* is attended to with the same as-

Inattention to the female in breeding.

siduity as that which has of late years been bestowed on cattle and sheep, while the breeding of *saddle-horses*, *hunters*, and *coach-horses*, is almost entirely neglected; is left almost wholly to chance, even in *Yorkshire*,—I mean as to females. A breeder here would not give five guineas for the best brood-mare in the kingdom, unless she could draw or carry him occasionally to market, nor a guinea extraordinary for one which could do both. He would sooner breed from a rip which he happens to have upon his premises, though not worth a month's keep. But how absurd! The price of the leap, the keep of the mare, and the care and keep of her progeny, from the time they drop to the time of sale, are the same, whether they be sold from ten to fifteen, or from forty to fifty pounds each." (Marshall's *Economy of Yorkshire*, vol. ii. p. 166.)

Stallions.

In those districts where the breeding of horses is carried on upon a large scale, and upon a regular plan, the rearing of stallions forms in some degree a separate branch, and is confined, as in the case of bulls and rams, to a few eminent breeders. These stallions, which are shown at the different towns in the vicinity,—sometimes sent to be exhibited at a considerable distance,—are let out for the whole season, or sold to stallion-men, or kept by the breeder himself, for covering such mares as may be offered, at a certain price per head; and this varies according to the estimation in which the horse is held, and sometimes according as the mare has more or less of what is called *blood*. For farm-mares, the charge for covering by a stallion of the same kind is commonly about a guinea, with half-a-crown to the groom; and it is a common practice in the north to agree for a lower rate if the mare does not prove with foal; sometimes nothing more is paid in that case than the allowance to the groom.

Age of breeding.

The age at which the animals should be allowed to copulate is not determined by uniform practice, and is made to depend in some measure on the degree of maturity, which, in animals of the same species, is more or less early, according to breed and feeding. Yet it would seem in general to be an improper practice to allow animals to propagate while they are themselves in a raw, unformed state, and require all the nutriment which their food affords, for raising them to the ordinary size of the variety to which they belong. It may, therefore, be seldom advisable to employ the stallion till he is about three years old, or the mare till she is a year older. But the greater number of mares kept for breeding are much older than this, and are, in many cases, not allowed to bring foals till they are in the decline of life, or otherwise unable to bear their full share in rural labour.

Season.

In the breeding of horses, as in all other kinds of live stock, it is of importance that, at the season of parturition, there should be a suitable supply of food for the young. The time of covering mares ought, therefore, to be partly regulated by a due regard to this circumstance, and may be earlier in the south than in the north, where grass, the most desirable food both for the dam and foal, does not come so early by a month or six weeks. In Scotland it is not advantageous to have mares to drop their foals sooner than the middle of April; and, as the period of gestation is about eleven months, they are usually covered in May, or early in June. But if mares are intended to bring a foal every year, they should be covered from the ninth to the eleventh day after foaling, whatever may be the time; and the horse should be brought to them again nine or eighteen days afterwards.

Mares worked.

The mares are worked in summer as usual, and more moderately in the ensuing winter, till near the time of foaling, when, if the season be somewhat advanced, even though the pasture be not fully sufficient for their maintenance, they should be turned out to some grass field near the homestead, and receive such additional supply of food as may be necessary, under sheds adjoining. It is both inconvenient and dangerous to confine a mare about to foal in a common stable, and still more so to leave her loose in a close stable among other horses; and confinement is not much less objectionable after dropping her foal. Such sheds are also exceedingly convenient even after grass has become abundant, as the weather is often cold and rigorous during the month of May. When the foal is a few weeks old, the mare is again put to light work; and she is separated from the foal altogether, after having nursed it for about six months.

Breeding mares are evidently unable to endure the fatigue of constant labour for some months before and after parturition. This has led a few farmers to rear foals upon cow-milk; but the practice is neither common, nor likely ever to become so. The greater number of horses, therefore, are bred in situations where a small portion of arable land is attached to farms chiefly occupied with cattle or sheep, or where the farms are so small as not to afford full and constant employment to the number of horses that must nevertheless be kept for the labour of particular seasons.

Foals.

"During the first winter, foals are fed on hay, with a little corn, but should not be constantly confined to the stable; for even when there is nothing to be got on the fields, it is much in their favour to be allowed exercise out of doors. A considerable proportion of succulent food, such as potatoes, carrots, and Swedish turnips (oil-cake has been recommended), should be given them through the first winter; and bean and peas meal has been advantageously substituted for oats, which, if allowed in a considerable quantity, are injurious to the thriving of the young animal, from their heating and astringent nature. Their pasture, during the following summer, depends upon the circumstances of the farms on which they are reared. In the second winter they are fed in much the same manner as in the first, except that straw may be given for some months instead of hay; and in the third winter they have a greater allowance of corn, as they are frequently worked at the harrows in the ensuing spring, when about three years old." (*General Report of Scotland*, vol. iii. p. 183.)

System of rearing.

The rearing of horses is carried on in some places in so systematical a manner, as to combine the profit arising from the advance in the age of the animals, with that of a moderate degree of labour before they are fit for the purposes to which they are ultimately destined. In the ordinary practice of the midland counties, the breeders sell them while yearlings, or perhaps when foals, namely, at six or eighteen months old, but most generally the latter. They are mostly bought up by the graziers of Leicestershire, and the other grazing parts of that district, where they are *grown* among the grazing stock until the autumn following. At two years and a half old they are bought up by the arable farmers, or dealers of Buckinghamshire, Berkshire, Wiltshire, and other western counties, where they are broken into harness, and worked till they are five, or more generally six years old. At this age the dealers buy them up again to be sent to London, where they are finally purchased for drays, carts, waggons, coaches, the army, or any other purpose for which they are found fit. (Marshall's *Economy of the Midland Counties*, vol. i. p. 311.)

A similar mode of transferring young horses from hand to hand is common in the west of Scotland. The farmers of Ayrshire and the counties adjacent, who generally crop not more than one-fourth, or at most one-third, of their arable land, and occupy the remainder with a dairy-stock, purchase young horses at the fairs of Lanark and Carnwath before mentioned,—work them at the harrows in the following spring when below two years old,—put them to the plough next winter at the age of two years and a half, and continue to work them gently till they are five years old, when they are sold again at the Rutherglen and Glasgow markets, at a great advance of price, to dealers and farmers from the south-eastern counties. A considerable number of horses, however, are now bred in the Lothians, Berwickshire, and Roxburghshire, the very high prices of late having rendered it profitable to breed them, even upon good arable land. But many farmers of these counties, instead of breeding, still prefer purchasing two and a half or three and a half year old colts, at the markets in the west country, or at Newcastle fair in the month of October. They buy in a certain number yearly, and sell an equal number of their work-horses before they are so old as to lose much of their value; so that their stock is kept up without any other loss than such as arises from accidents; and the greater price received for the horses they sell is often sufficient to cover any such loss. (*General Report of Scotland*, vol. iii. p. 182.)

Castration.

Castration is performed on the males commonly when they are about a year old; but a late writer strongly disapproves of delaying this operation so long, and recommends *twitching* the colts (a practice well known to ram-breeders) any time after they are a week old, or as soon after as the testicles are come down; and this method, he says, he has followed himself with great success. (Parkinson *on Live Stock*, vol. ii. p. 74.) Another writer suggests, for experiment, the *spaying* of mares, thinking they would work better and have more wind than geldings. (Marshall's *Yorkshire*, vol. ii. p. 169.) But he does not appear to have been aware that this is by no means a new experiment; for Tusser, who wrote in 1562, speaks of *gelding fillies* as a common practice at that period. The main objection to this operation is not that brood-mares would become scarce, as he supposes, but that, by incapacitating them from breeding, in case of accidents and in old age, the loss on this expensive species of live stock would be greatly enhanced. An old or lame mare would then be as worthless as an old or lame gelding is at present.

3. *Feeding and Working.*

Age of working.

The age at which horses are put to full work, in the labours of a farm, is usually when four or five years old, according to the nature of the soil and the numbers of the team; but they are always understood to be able to pay for their maintenance after they are three years old, by occasional work in ploughing and harrowing.

It is not so common a practice as it should be to subject young horses of this kind to any regular course of training; but they are made familiar with their keeper as soon as they are weaned, led about in a halter, rubbed down in the stable, and treated with gentleness; and before being put to work, it is usual to place them under the charge of a steady, careful servant, who very soon learns them to drag a harrow alongside of an older horse, and afterwards to take their share of the labour at the plough, and, by degrees, in all the other work of the farm.

With regard to the mode of feeding and working them, and their treatment in general, the practice is so various, according to the state of agriculture in different districts, and the circumstances of their owners, that all that can be done here is to mention some leading points of management, in which all good farmers are agreed.

Selection of work-horses for different purposes.

The selection of horses adapted to particular situations is evidently a matter of primary consideration. It has been already hinted that the heavy, black cart-horses, so much valued in London and a few other great towns, are but ill adapted to the operations of modern husbandry; and the nature of the soil and surface, and the situation of a farm in regard to markets, manure, and fuel, require some difference in the strength, activity, and hardiness of this instrument of labour. Accordingly, in the northern counties of Britain, where economy in this department is more attended to than in the south, we find horses of considerable strength, and a moderate share of activity, employed on firm, cohesive soils; and on light, friable soils, such as are possessed of more activity, not apt from their weight to be soon fatigued by working on an unequal surface, and able to endure travelling, with a moderate load, for a considerable distance, without injury.

Kept in good condition.

Whatever may be the description of horses employed, it is always a rule with good managers never to allow them to fall off in condition so much as to be incapable of going through their work without frequent applications of the lash. There is nothing which more clearly marks the unprosperous condition of a tenant, than the leanness of his working cattle, and their reluctant movements under this severe stimulus. There are particular operations, indeed, such as turnip-sowing, seeding fallows, harvest-work, &c. which require to be executed with so great dispatch in our variable climate, that unusual exertions are often indispensable. At these times it is hardly possible, by the richest food and the most careful treatment, to prevent the animals from losing flesh, sometimes even when their spirit and vigour are not perceptibly impaired. Such labours, however, do not continue long, and should always be followed by a corresponding period of indulgence. It is particularly dangerous and unprofitable to begin the spring labour with horses worn down by bad treatment during winter.

Feeding.

Much has been said about the great expense of feeding horses on corn and hay, and various roots have been recommended as advantageous substitutes. That these animals can ever be made to perform their labour, according to the *present* courses of husbandry, on carrots, turnips, potatoes, or other roots alone, or as their *chief* food, our own experience and observation lead us to consider as very improbable. They will work and thrive on such food; but they will work as much more, and thrive as much better, with oats or beans in addition, as fully to repay the difference in expense. One of the three meals a day which farm-horses usually receive may consist of roots, and a few of them every twenty-four hours are highly conducive to the health of the animals; but we have never had occasion to see any horse work regularly throughout the year, in the way they are usually worked in the best cultivated districts, without an allowance of at least an English peck of oats, or mixed oats and beans, daily, less or more at particular periods, but rather more than this quantity for at least nine months in the year.

It has been already observed, that machines are in some places used for cutting hay and straw into chaff, for bruising or breaking down corn, and for preparing roots and other articles by means of steam. The advantages of these practices, both in regard to the economy of food and the health of the animals, are too evident to require illustration. But the custom, which has been adopted by a few individuals, and injudiciously recommended by others, of cutting down oats with their straw into the state of chaff, without being previously threshed, is wasteful and slovenly in the extreme. The proportion, as to quantity or quality, which the oats bear to the bulk of the straw, being various in every season, and almost in every field, the proper allowance of oats can be served out only by first separating them from the straw, and then mixing them with the cut straw or chaff, in suitable proportions, before being laid into the manger.

Work performed.

The work performed is evidently a question of circumstances, which does not admit of any precise solution. It has been observed in the section on tillage, that a two-horse plough may, on an average, work about an English acre a day throughout the year; and, in general, according to the nature of the soil, and the labour that has been previously bestowed on it, a pair of horses, in ploughing, may travel daily from ten to fifteen miles, overcoming a degree of resistance equal to from four to ten hundredweights. On a well-made road, the same horses will draw about a ton in a two-wheeled cart for twenty or twenty-five miles every day; and *one* of the better sort, in the slow movement of the carrier or waggoner, commonly draws this weight by himself on the best turnpike roads. In some places horses are in the yoke, when the length of the day permits, nine hours, and in others ten hours a day; but, for three or four months in winter, only from five to eight hours. In the former season they are allowed to feed and rest two hours from mid-day; and, in the latter, they have a little corn on the field when working as long as there is day-light, but none if they work only five or six hours.

In the section on farm-buildings, we have described with some minuteness the construction and interior arrangement of modern stables; and it is only necessary to add here, that the stable-management of horses has been greatly improved of late years. It is not long since there were instances, even in the Border counties, of horses being turned loose into a stable, without racks or mangers, and without any other litter than the straw intended for their food, which they tossed about in all directions. Even those farmers who found it necessary to confine them to separate *stances*, did not see the advantage of separating them by partitions, but left them standing, as is too generally the case at present with cattle, at liberty to inflict, and exposed to endure, serious injuries and privations. When at last they were confined in stalls, it was common to place two in each, by way of saving room and the expense of partitions; and with the same view they were made to stand in double rows, one row on each gable or side-wall, the hind legs of each row so near those of the opposite one as to leave little room for carrying away their dung without danger, and to afford little security against the attacks from behind of vicious horses placed on the opposite sides of the stable. That all these inconveniences are avoided in the present stables, must be evident from the description already given, and the engraving there referred to.

Stable-management.

It is now well understood that the liberal use of the brush and the currycomb twice a day,—frequent but moderate meals, consisting of a due proportion of succulent joined to more solid food,—abundance of fresh litter, and great attention to method and cleanliness, are as indispensable in the stable of a farmer (as far as is consistent with a just regard to economy) as they have always been held to be in the treatment of horses kept for pleasure. Good dressing, with all well-informed and attentive men, is considered to be no less necessary to the thriving of the horses than good feeding: according to a common expression, it is equal to half their food. We shall conclude this section with an extract from a recent publication, for the purpose of explaining the minutiæ of management adopted in the most improved counties of Scotland.

General management in Scotland.

"For about four months in summer, horses are fed on pastures, or on clover and ryegrass, and tares cut green and brought home to the stable or fold-yard; the latter method being by far the most economical and advantageous. For other eight months they are kept on the straw of oats, beans, and peas, and on clover and ryegrass hay. As soon as the grass fails towards the end of autumn, they have hay for a few weeks; and when the days become so short as to allow of no more than from six to eight hours' work, they are very generally fed with different kinds of straw, according to the circumstances of the farm. In the month of March they are again put to hay, till the grass is ready for being cut. Throughout all the year they are allowed more or less corn when constantly worked; and during the time they are on dry fodder, particularly when on straw, they have potatoes, yams, or Swedish turnips, once a day, sometimes boiled barley, and, in a few instances, carrots. A portion of some of these roots is of great importance to the health of horses, when succulent herbage is first exchanged for hay at the end of autumn; and it is no less so towards the latter end of spring, when hay has become sapless, and the labour is usually severe. At these two periods, therefore, it is the practice of all careful managers to give an ample allowance of some of these roots, even though they should be withheld for a few weeks during the intermediate period.

"The quantity of these different articles of food must depend on the size of the horses, and the labour they perform; and the value, upon the prices of different seasons, and in every season, on the situation of the farm with respect to markets, particularly for hay and roots, which bring a very different price near large towns, and at a few miles distance. It is for these reasons that the yearly expense of a horse's maintenance has been estimated at almost every sum from L.15 to L.40. But it is only necessary to attend to the expense of feeding horses that are capable of performing the labour required of them under the most correct and spirited management. Such horses are fed with oats, sometimes with beans, three times a day, for about eight months; and twice a day for the other four, when at grass; and, at the rate of eight feeds per bushel, each horse will eat fifteen quarters of oats, or twenty bolls Linlithgow measure, in the year. When on hay, he will require about one stone of twenty-two pounds avoirdupois daily, and five pounds more if he does not get roots. One English acre of clover and ryegrass, and tares, may be necessary for four months soiling; and a quarter of an acre of potatoes, yams, or Swedish turnips, during the eight months he is fed with hay or straw. The use of these roots may admit of a small diminution of the quantity of corn in the winter months, or a part of it may be, as it almost always is, of an inferior quality."

Expense of a horse-plough.

The expense of a horse-plough must be different according to the situation, but is in every case considerable. The feeding of the horses, with the interest of capital, decline in value, and loss by accidents or disease, and the charges for harness, shoeing, and farriery, were calculated, towards the latter end of the last war, when the prices were high, at from L.90 to L.100 per annum, which, with the wages of the ploughman, would be equal to 40s. for every acre of the land which they cultivated; but with present prices an abatement may be made of 20 or 25 per cent.; reducing the whole charges upon a plough, wages included, to about L.100 per annum, and the expense per acre to 30s. or 32s. It is no doubt true that the expense is in many places considerably less than this; but we speak here of horses fully employed throughout the year, and in the improved system of husbandry. Farmers who keep their accounts in a proper manner charge for every day's work of a man and a pair of horses from 7s. 6d. to 10s.; and when land is in an ordinary state of cultivation, it is sometimes let out to plough at the rate of 6s. to 8s. per acre.

Whether oxen may be used instead of horses.

It has been long alleged that oxen might be beneficially substituted for horses, in the common operations of agriculture; and a great many calculations have been submitted to the public on both sides of the question. Startling as it may seem, however, these calculations prove nothing. The first point is to show, that the two animals are equally adapted to every sort of farm labour. There are other elements which enter into this question than the actual expenditure on either side; and with reference to the present state of agriculture in this country, we hold it as a fact ascertained by general experience, that oxen cannot be employed with advantage, except in particular sorts of labour which do not go on all the year round, but are only performed occasionally or at certain seasons. The constant employment of oxen, to the entire exclusion of horses, is, we venture to assert, impracticable in this country, and, if it were practicable, would not be profitable. It is readily admitted, that oxen are well adapted to the ploughing of coarse tough swards, and other lands so much occupied with stones or roots as to require a slow and steady power. They have also been found useful for threshing-machines worked by animal power, for the same reason. But in almost all the other kinds of labour necessary upon an extensive farm, oxen, such at least as are bred in this country, are troublesome, inefficient, slow, and unprofitable labourers. They are not suited to the cart or waggon, even on our fields, and far less for travelling upon our public roads. They cannot perform their work with the dispatch necessary in our variable climate at seedtime and harvest; and in the preparing, manuring, and seeding of large fields of turnip, a process which calls for so much exertion and dispatch in Norfolk and other turnip counties, the employment of oxen is entirely inadmissible. Within certain limits a horse will work according as he is fed; but if an ox is pushed beyond his natural step, he is soon rendered useless.

On a practical question of this nature it is experience alone that can decide; and there is none as to which general experience is more conclusive. In the rude state of agriculture which prevailed in this country before the introduction of clover and turnips, oxen were, as they still continue to be in some parts of the Continent, more generally employed in the home work of a farm than horses; but in the progress of improvement, oxen have been gradually laid aside, till horses are now, with comparatively few exceptions, universally employed in their stead. So much is this the case, that one might almost estimate beforehand the state of agriculture in any district where oxen are in general use. But the change from oxen to horses, in the labours of agriculture, is not confined to this country. A similar change has been long going on on the Continent, particularly in France, where, according to their best agricultural writers, the horse is preferred for the same reasons as in this country. The advocates for the use of oxen, in fact, are in general persons of little or no practical knowledge, who look only to the original cost and the comparative expense of maintaining the animals, with the accidents and diseases to which the horse is liable; but they do not take into view what that cost and that expense of maintenance would be if oxen were to come into general use, and how far this change would affect the supply of our butcher market; nor do they consider the loss upon the ploughman's wages, when he goes over an acre a day or more with the one species of animals, and not more than half as much with the other. They might reflect too upon the necessity there is for the employment of horses in drays and waggons in our public streets and in long journeys. To provide for the necessary supply, these horses must be reared as a part of the farmer's live stock; and as he begins to work them so early as at three years old, they return to him much more than the price of their food, before they come to the age of five or six years, which is as soon as they are fit for the waggoner or the drayman. With all these considerations in view, the arguments drawn from the husbandry of the Greeks and Romans, and the modern practice of other countries, will have no more weight with the enlightened farmers of Britain than if it were attempted to prove the superiority of manual and animal labour over machinery in threshing and other operations. Such men will always continue to apply each species of animal to its proper use, and seek for labour from the horse, and beef from the ox; improving the breeds of both with a view to these distinct objects, instead of vainly attempting to obtain meat and labour from the latter animal. By this management, as we shall see immediately, our cattle are now prepared for the butcher at a much earlier period than formerly, and afford an adequate return in their carcass alone.

SECT. II. CATTLE.

Variety of breeds of cattle.

The purposes for which cattle are kept being more various, and cattle being also for the most part not so completely domesticated as horses, this species includes a much greater number of breeds and varieties. The different races have been distinguished generally by the length of their horns, or by their having no horns at all; and again subdivided, and more particularly described under the names of the counties or districts where they are supposed to have originated, where they most abound, or where they exist in the greatest purity.

In Britain, as in most other countries, horses are useful only for the labour they perform, though it is probable that nothing but prejudice prevents them from enlarging, at least occasionally, the supply of human food; and to render them fit for labour, they must sooner or later in their lives be entirely subjected to the care and control of man. Cattle, on the other hand, except the few kept for labour and for their milk, have not, till of late (and even now only in particular countries), been the objects of that discipline and those experiments which seek to restrain habits acquired in a state of nature—to improve forms and proportions, perpetuated and somewhat varied by climate, surface, and herbage—and to cultivate and bring to perfection, with the greatest possible economy, all those valuable properties with which nature has endowed the inferior animals for the subsistence and the comfort of man. In most parts of the world cattle are still merely the creatures of soil and climate; and it is a striking evidence of the greater progress of social improvement in Britain, that we possess races of cattle and sheep, formed in a great measure by skill and industry, which excel beyond all comparison those of every other country.

Different products.

The three great products of cattle—meat, milk, and labour—have each of them engaged the attention of British agriculturists; but experience has not hitherto justified the expectation that has been entertained of combining all these desirable properties, in an eminent degree, in the same race. That form which indicates the property of yielding the most milk, differs materially from that which we know from experience to be combined with early maturity and the most valuable carcass; and the breeds which are understood to give the greatest weight of meat for the food they consume, and to contain the least proportion of offal, are not those which possess, in the highest degree, the strength and activity required in beasts of labour.

As we propose to treat of the produce and manufacture of milk in a separate article (see DAIRY), we shall there have occasion to notice those breeds of which the females are most valuable for the dairy; only referring at present to Plate XIII. for an engraving of the Ayrshire cow, an excellent race, spread over that and the counties adjacent. And as cattle are seldom or never reared exclusively, or even chiefly, for the purpose of labour, which is now in most parts of Britain performed entirely by horses, it will be sufficient to apply our remarks in an especial manner to the races themselves, and the modes of treatment which are best adapted to the production of beef.

"Whatever be the breed," says Mr Culley, "I presume that, to arrive at excellence, there is one form or shape essential to all, which form I shall attempt to give in the following description of a bull.

Form of the male.

"The head of the bull should be rather long, and muzzle fine; his eyes lively and prominent; his ears long and thin; his horns white; his neck rising with a gentle curve from the shoulders, and small and fine where it joins the head; his shoulders moderately broad at the top, joining full to his chine and chest backwards, and to the neck-vein forwards; his bosom open; breast broad, and projecting well before his legs; his arms or fore thighs muscular, and tapering to his knee; his legs straight, clean, and very fine boned; his chine and chest so full as to leave no hollow behind the shoulders; the plates strong, to keep his belly from sinking below the level of his breast; his back or loin broad, straight, and flat; his ribs rising one above another, in such a manner that the last rib shall be rather the highest, leaving only a small space to the hips or hooks, the whole forming a round or barrel-like carcass; his hips should be wide placed, round or globular, and a little higher than the back; the quarters (from the hip to the rump) long, and instead of being square, as recommended by some, they should taper gradually from the hips backward, and the turls or pottbones not in the least protuberant; rump close to the tail; the tail broad, well haired, and set on so high as to be in the same horizontal line with his back." (Culley *on Live Stock*, p. 38.)

1. *Breeds.*

Breeds. Long-horned.

1. The *Long-horned* or *Lancashire* breed of cattle is distinguished from others by the length of their horns, the thickness and firm texture of their hides, the length and closeness of their hair, the large size of their hoofs, and coarse, leathery, thick necks: they are likewise deeper in their fore quarters and lighter in their hind quarters than most other breeds,—narrower in their shape, less in point of weight, than the short-horns, though better weighers in proportion to their size; and though they give considerably less milk, it is said to afford more cream in proportion to its quantity.

They are more varied in their colour than any of the other breeds; but, whatever the colour be, they have in general a white streak along their back, which the breeders term *finched*, and mostly a white spot on the inside of the hough. (*Id.* p. 53.)

In a general view, this race, notwithstanding the singular efforts that have been made towards its improvement, remains with little alteration; for, excepting in Leicestershire, none of the subvarieties (which differ a little in almost every one of those counties where the long-horns prevail (have undergone any radical change, nor any obvious improvement.

Improved Leicesters.

The improved breed of Leicestershire is said to have been formed by Mr Webster of Canley, near Coventry, in Warwickshire, by means of six cows brought from the banks of the Trent about 90 years ago, which were crossed with bulls from Westmoreland and Lancashire. Mr Bakewell of Dishley, in Leicestershire, afterwards got the lead as a breeder, by selecting from the Canley stock; and the stocks of several other eminent breeders have been traced to the same source. (Marshall's *Midland Counties*, vol. i. p. 318.) See Plate XIV.

Short-horned.

2. The *Short-horned*, sometimes called the Dutch breed, is known by a variety of names, taken from the districts where they form the principal cattle-stock, or where most attention has been paid to their improvement. Thus, different families of this race are distinguished by the names of the *Holderness*, the *Teeswater*, the *Yorkshire*, *Durham*, *Northumberland*, and other breeds. The Teeswater breed, a variety of short-horns, established on the banks of the Tees, at the head of the vale of York, is at present in the highest estimation, and is alleged to be the true Yorkshire short-horned breed. Bulls and cows from this stock, purchased at most extraordinary prices, are spread over all the north of England and the border counties of Scotland. The bone, head, and neck of these cattle are fine; the hide is very thin, the chine full, the loin broad, and the carcass throughout large and well fashioned; and the flesh and fatting quality equal, or perhaps superior, to those of any other large breed. The short-horns give a greater quantity of milk than any other cattle; a cow usually yielding 24 quarts of milk per day, making three firkins of butter during the grass season. Their colours are much varied, but they are generally red and white mixed, or what the breeders call *flecked*. See Plate XIV.

"The heaviest and largest oxen of the short-horned breed, when properly fed, victual the East India ships, as they produce the thickest beef, which, by retaining its juices, is the best adapted for such long voyages. Our royal navy should also be victualed from these; but, by the jobs made by contractors, and other abuses, I am afraid our honest tars are often fed with beef of an inferior quality. However, the coal ships from Newcastle, Shields, Sunderland, &c. are wholly supplied with the beef of these valuable animals.

"These oxen commonly weigh from 60 to 100 stone (14 lb. to the stone), and they have several times been fed to 120, 130, and some particular ones to upwards of 150 stone, the four quarters only." (Culley *on Live Stock*, p. 48.)

Middle-horned.

3. The *Middle-horned* breeds comprehend in like manner several local varieties, of which the most noted are the *Devons*, the *Sussexes*, and the *Herefords*; the two last, according to Mr Culley, being varieties of the first, though of a greater size, the Herefords being the largest. These cattle are the most esteemed of all our breeds for the draught, on account of their activity and hardiness. They do not milk so well as the short-horns, but are not deficient in the valuable property of feeding at an early age, when not employed in labour.

Devons.

The *Devonshire* cattle are "of a high red colour (if any white spots, they reckon the breed impure, particularly if those spots run into one another), with a light dun ring round the eye, and the muzzle of the same colour; fine in the bone, clean in the neck, horns of a medium length bent upwards, thin-faced and fine in the chops, wide in the hips, a tolerable barrel, but rather flat on the sides, tail small and set on very high; they are thin-skinned, and silky in handling, feed at an early age, or arrive at maturity sooner than most other breeds." (Culley *on*

Live Stock, p. 51.) Another writer observes, that they are a model for all persons who breed oxen for the yoke. (Parkinson *on Live Stock*, vol. i. p. 112.) The weight of the cows is usually from 30 to 40 stone, and of the oxen from 40 to 60. The North Devon variety, in particular, from the fineness in the grain of the meat, is held in high estimation in Smithfield. (Dickson's *Practical Agriculture*, vol. ii. p. 120.)

Sussex and Hereford.

The *Sussex* and *Herefordshire* cattle are of a deep red colour, with fine hair and very thin hides; neck and head clean; horns neither long nor short, rather turning up at the points; in general they are well made in the hind quarters, wide across the hips, rump, and sirloin, but narrow in the chine; tolerably straight along the back; ribs too flat; thin in the thigh; and bone not large. An ox, six years old, when fat, will weigh from 60 to 100 stone, the fore quarters generally the heaviest. The oxen are mostly worked from three to six years old, sometimes till seven, when they are turned off for feeding. The Hereford cattle are next in size to the Yorkshire short-horns. Both this and the Gloucester variety are highly eligible as dairy stock, and the females of the Herefords have been found to fatten better at three years old than any other kind of cattle except the spayed heifers of Norfolk. (Marshall's *Economy of Gloucestershire.*)

Polled breeds.

4. The *Polled* or *hornless* breeds. The most numerous and esteemed variety is the Galloway breed, so called from the province of that name, in the south-west of Scotland, where they most abound. The true Galloway bullock "is straight and broad on the back, and nearly level from the head to the rump; broad at the loins, not, however, with hooked bones, or projecting knobs; so that when viewed from above, the whole body appears beautifully rounded, like the longitudinal section of a roller. He is long in the quarters, but not broad in the twist. He is deep in the chest, short in the leg, and moderately fine in the bone, clean in the chop and in the neck. His head is of a moderate size, with large, rough ears, and full but not prominent eyes or heavy eye-brows, so that he has a calm, though determined look. His well-proportioned form is clothed with a loose and mellow skin, adorned with long, soft, glossy hair." (*Galloway Report*, p. 236.) The prevailing colour is black or dark brindled; and, though they are occasionally found of every colour, the dark colours are uniformly preferred, from a belief that they are connected with superior hardiness of constitution. The Galloways are rather under-sized, not very different from the size of the Devons, but as much less than the long-horns as the long-horns are less than the short-horns. On the best farms the average weight of bullocks three years and a half old, when the greater part of them are driven to the south, has been stated at about forty stone avoirdupois. Some of them, fattened in England, have been brought to nearly one hundred stone. See Plate XV.

The general properties of this breed are well known in almost every part of England, as well as in Scotland. They are sometimes sent from their native pastures directly to Smithfield, a distance of 400 miles, and sold at once to the butcher; and in spring they are often shown in Norfolk, immediately after their arrival, in as good condition, or even better than when they began their journey. With full feeding, there is perhaps no breed that sooner attains maturity, and their flesh is of the finest quality. Mr Culley was misinformed about the quantity of milk they yield, which, though rich, is by no means abundant. "It is alleged not to be more than seventy or eighty years since the Galloways were all horned, and very much the same, in external appearance and character, with the breed of black-cattle which prevailed over the west of Scotland at that period, and which still abound in perfection, the largest sized ones in Argyllshire, and the smaller in the Isle of Skye. The Galloway cattle, at the time alluded to, were coupled with some hornless bulls, of a sort which do not seem now to be accurately known, but which were then brought from Cumberland; the effects of which crossing were thought to be the general loss of horns in the former, and the enlargement of their size; the continuance of a hornless sort being kept up by selecting only such for breeding, or perhaps by other means, as by the practice of eradicating with the knife the horns in their very young state." (Coventry *on Live Stock*, p. 28.)

The Galloway cattle, besides occupying almost exclusively the stewartry of Kirkcudbright and the shire of Wigton, the two divisions of Galloway, are now spread over the adjoining county of Dumfries, and are to be found in smaller numbers in most of the other districts of Scotland. The cattle of Angus or Forfarshire, on the east coast, many of which are also without horns, resemble the Galloways in their colour, size, and general properties.

Suffolk Duns.

The *Suffolk Duns*, according to Mr Culley, are nothing more than a variety of the Galloway breed. He supposes them to have originated in the intercourse that has long subsisted between the Scotish drovers of Galloway cattle, and the Suffolk and Norfolk graziers who feed them. The Suffolks are almost all light duns, thus differing from the Galloways; and are considered a very useful kind of little cattle, particularly for the dairy.[1]

Highlands.

5. The cattle of the Highlands of Scotland are divided into a number of local varieties, some of which differ materially from others, probably owing to a difference in the climate and the quality of the herbage, rather than to their being sprung from races originally distinct, or to any great change effected either by selection or by crossing with other breeds. It is only of late that much attention has been paid to their improvement in any part of that extensive district; and in the northern and central Highlands the cattle are yet, for the most part, in as rude a state, and under management as defective, as they were some centuries ago.

These cattle have almost exclusive possession of all that division of Scotland, including the Hebrides, marked off by a line from the Frith of Clyde on the west to the Moray Frith on the north, and bending towards the east till it approaches in some places very near to the German Ocean. Along the eastern coast, north of the Frith of Forth, the Highland cattle are intermixed with various local breeds, of which they have probably been the basis. There are more or less marked distinctions among the cattle of the different Highland counties; and, in common language, we speak of the Inverness-shire, the Banffshire, &c. cattle, as if they were so many separate breeds; but it is only necessary in this place to notice the two more general varieties, now clearly distinguishable by their form, size, and general properties.

West Highlands, Argyllshire or Skye.

The most valuable of these are the cattle of the Western Highlands and Isles, commonly called the *Argyllshire breed*, or the breed of the Isle of Skye, one of the islands attached to the county of Inverness. The cattle of the Hebrides are called *Kyloes*, a name which is often applied in the south to all the varieties of the Highland cattle, not, as a late writer (Dickson's *Practical Agriculture*, vol. ii.

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[1] Culley *on Live Stock*, p. 66; and Parkinson *on Live Stock*, vol. i. p. 118.

p. 1124) has imagined, from the district in Ayrshire called Kyle, where very few of them are kept, but from their crossing, in their progress to the south, the *kyloes* or ferries in the mainland and Western Islands, where these cattle are found in the greatest perfection. (*General Report of Scotland*, vol. iii. p. 26.)

A bull of the Kyloe breed should be of a middle size, capable of being fattened to fifty stone avoirdupois. His colour should be black, or dark brown, or reddish brown, without any white or yellow spots. His head should be rather small, his muzzle fine, his horns equable, not very thick, of a clear green and waxy tinge; his general appearance should combine agility, vivacity, and strength; and his hair should be glossy, thick, and vigorous, indicating a sound constitution and perfect health. See Plate XV.

For a bull of this description Mr Macneil of Colonsay refused 200 guineas; and for one of an inferior sort he actually received L.170 sterling. Mr Macdonald of Staffa bought one, nine years old, at 100 guineas. (*Report of the Hebrides*, p. 425.)

The lean weight of the best stock, from three to four years old, when they are commonly sold to the south, is from twenty-six to thirty stone the four quarters; but when brought to good pastures, they can be easily raised to fifty stone and upwards. There is perhaps no other breed whose weight depends so much on feeding, nor any that fattens and grows so much at the same time. They are exceedingly hardy, easily maintained, speedily fattened on pastures where large animals could scarcely subsist; the beef is fine in the grain, and well marbled or intermixed with fat; and their milk is rich, but small in quantity.

Norlands.

The other variety of Highland cattle is the *Norlands*, or North Highlanders, including the stocks of the counties of Ross, Cromarty, Sutherland, Caithness, and parts adjacent. Their hides are generally coarse, backs high and narrow, ribs flat, bones large, and legs long and feeble for the weight of the chest; and they are considered very slow feeders. But though this description be but too applicable to the cattle of the greater part of that remote district, considerable improvement has been effected in many parts of it, by crossing with the Skye or Argyll breeds, within the last twenty years.

Orkney and Zetland.

The cattle of the northern isles of Orkney and Zetland are of a most diminutive size; an ox weighing about sixty pounds a quarter, and a cow forty-five pounds. They are of all colours, and their shapes are generally bad; yet they give a quantity of excellent milk, fatten rapidly when put on good pastures, and, in their own district, are considered strong, hardy, and excellent workers, when well trained to the yoke, and so plentifully fed as to enable them to support labour.

Fifeshire.

6. It has been already observed, that all along the lowlands of the eastern coast of Scotland, to the north of the Frith of Forth, there are varieties of cattle which, whatever may have been their origin, differ as much from the cattle of the western and northern Highlands as most of those that have been described as separate breeds. Of the Fifeshire cattle, Mr Culley observes, "You would at first imagine them a distinct breed, from their upright white horns, being exceedingly light-lyered and thin-thighed; but I am pretty clear it is only from their being more nearly allied to the kyloes, and consequently less of the coarse kind of short-horns in them." (Culley *on Live Stock*, p. 69.) Notwithstanding this opinion, the cattle of the north-eastern counties of Scotland require, for every useful purpose, to be mentioned separately from the Highland breeds; and as all of them have a general resemblance, it will only be necessary, in this place, to notice the Fife cattle in particular.

There are various traditions about the origin of this variety. It is said to have been much improved by English cows, sent by Henry VII. to his daughter, the consort of James IV., who usually resided at the palace of Falkland in that county; and as there is some resemblance between the cattle of Fife and Cambridgeshire, they are supposed to have been brought originally from the latter county. Others ascribe the origin of the present breed to bulls and cows sent by James VI. (James I. of England), in payment of the money which his obliging neighbours in Fife are said to have advanced for his equipment, when he went to take possession of the English throne. (*Report of Nairn and Moray*, p. 305.)

The prevailing colour of the Fife cattle is black, though sometimes spotted or streaked with white, and some of them are altogether grey. The horns are small, white, generally pretty erect, or at least turned up at the points, bending rather forward, and not wide-spread like the Lancashire long-horned breed. The bone is small in proportion to the carcass, the limbs clean but short, and the skin soft. They are wide between the hook-bones; the ribs narrow, wide set, and having a great curvature. They fatten quickly, and fill up well at all the choice points; are hardy, fleet, and travel well, and are excellent for labour, both at plough and cart. A good cow of this breed gives from eighteen to twenty-four quarts of milk per day, yielding from seven to nine pounds of butter, and from ten to twelve pounds of cheese per week (twenty-four ounces to the pound), for some months after calving. (*Fife Report*, p. 251 and 253.)

Aberdeenshire.

The cattle of Aberdeenshire, the largest of which are said to have been produced by crossing with Fife bulls, have been long highly esteemed in the southern markets. It is observed, that every succeeding generation of them has increased in size for the last 30 years, and that the native breed has doubled its former weight since the introduction of turnips. (*Aberdeenshire Report*, p. 468.) The colour is commonly black, but there are many of a red and brindled colour. They are thinner in the buttock in proportion to their weight, and deeper in the belly in proportion to their circumference, than the West Highlanders, and they yield a much larger quantity of milk. Many of them are brought to the south of Scotland, and kept during winter in the straw-yards, for which they suit better than smaller cattle, as they are not so impatient of confinement. The ordinary weight of middle-sized oxen, at from three to five years old, is from forty to fifty stone; but after being worked for some time, and thoroughly fattened, they have been known to reach double this weight.

Welsh.

7. Of the *Welsh* cattle "there seem to be two distinct kinds. The large sort are of a brown colour, with some white on the rump and shoulders, denoting a cross from the long-horns, though in shape not the least resembling them. They are long in the legs, stand high according to their weight, are thin in the thigh, and rather narrow in the chine; their horns are white, and turned upwards; they are light in flesh, and, next to the Devons, well formed for the yoke; have very good hoofs, and walk light and nimble. The other sort are much more valuable; colour black, with very little white; of a good useful form, short in the leg, with round, deep bodies; the hide is rather thin, with short hair; they have a lively look and a good eye; and the bones, though not very small, are neither large nor clumsy; and the cows are considered good milkers." (Parkinson *on Live Stock*, vol. i. p. 135.)

Alderney.

8. The *Alderney* cattle are to be met with only about

the seats of a few great landholders, where they are kept chiefly for the sake of their milk, which is very rich, though small in quantity. This race is considered by very competent judges as too delicate and tender to be propagated to any extent in Britain, at least in its northern parts. Their colour is mostly yellow or light red, with white or mottled faces: they have short, crumpled horns, are small in size, and very ill shaped; yet they are fine-boned in general; and their beef, though high-coloured, is very well flavoured. I have seen, says Mr Culley, some very useful cattle bred from a cross between an Alderney cow and a short-horned bull.

Wild breed.

9. The last variety of cattle we shall mention is the *wild* breed, which is found only in the parks of a few great proprietors, who preserve the animals as a curiosity. Those kept at Chillingham Castle in Northumberland, a seat belonging to the earl of Tankerville, have been very accurately described in the *Northumberland Report*, and in Mr Culley's book *on Live Stock*, so often quoted in this article.

"Their colour is invariably of a creamy white; muzzle black; the whole of the inside of the ear, and about one-third of the outside, from the tips downward, red; horns white, with black tips, very fine, and bent upwards; some of the bulls have a thin upright mane, about an inch and a half or two inches long. The weight of the oxen is from 35 to 45 stone, and the cows from 25 to 35 stone the four quarters (14 pound to the stone). The beef is finely marbled, and of excellent flavour.

"From the nature of their pasture, and the frequent agitation they are put into by the curiosity of strangers, it is scarce to be expected they should get very fat; yet the six-years-old oxen are generally very good beef, from whence it may be fairly supposed that, in proper situations, they would feed well.

"At the first appearance of any person they set off in full gallop, and, at the distance of about 200 yards, make a wheel round and come boldly up again, tossing their heads in a menacing manner; on a sudden they make a full stop, at the distance of 40 or 50 yards, looking wildly at the object of their surprise, but, upon the least motion being made, they all again turn round, and fly off with equal speed, but not to the same distance, forming a shorter circle, and again returning with a bolder and more threatening aspect than before; they approach much nearer, probably within 30 yards, when they again make another stand, and again fly off: this they do several times, shortening their distance, and advancing nearer and nearer, till they come within such a short distance that most people think it prudent to leave them, not choosing to provoke them further.

"The mode of killing them was perhaps the only modern remains of the grandeur of ancient hunting. On notice being given that a wild bull would be killed on a certain day, the inhabitants of the neighbourhood came mounted and armed with guns, &c. sometimes to the amount of 100 horse and 400 or 500 foot, who stood upon walls or got into trees, while the horsemen rode off the bull from the rest of the herd, until he stood at bay, when a marksman dismounted and shot. At some of these huntings, 20 or 30 shots have been fired before he was subdued. On such occasions the bleeding victim grew desperately furious, from the smarting of his wounds, and the shouts of savage joy that were echoing from every side. But, from the number of accidents that happened, this dangerous mode has been little practised of late years, the park-keeper alone generally shooting them with a rifled gun at one shot.

"When the cows calve, they hide their calves for a week or ten days in some sequestered situation, and go and suckle them two or three times a day. If any person come near the calves, they clap their heads close to the ground, and lie like a hare in form, to hide themselves. This is a proof of their native wildness, and is corroborated by the following circumstance that happened to the writer of this narrative (Mr Bailey of Chillingham), who found a hidden calf, two days old, very lean and very weak. On stroking its head it got up, pawed two or three times like an old bull, bellowed very loud, stepped back a few steps, and *bolted* at his legs with all its force; it then began to paw again, bellowed, stepped back, and bolted as before; but knowing its intention, and stepping aside, it missed him, fell, and was so very weak, that it could not rise, though it made several efforts:—but it had done enough;—the whole herd were alarmed, and, coming to its rescue, obliged him to retire; for the dams will allow no person to touch their calves, without attacking them with impetuous ferocity.

"When a calf is intended to be castrated, the park-keeper marks the place where it is hid, and when the herd are at a distance, takes an assistant with him on horseback; they tie a handkerchief round the calf's mouth to prevent its bellowing, and then perform the operation in the usual way, with as much expedition as possible.—When any one happens to be wounded, or is grown weak and feeble through age or sickness, the rest of the herd set upon it and gore it to death." (Culley *on Live Stock*, p. 73.)

2. *Breeding and Rearing.*

Great attention to breeding.

The pedigrees of the best cattle have been preserved with no less care, in several parts of England, than those of race-horses; and in the selection of breeders, the properties of the family from which they have descended are matters of scarcely less importance than the form of the young animals themselves. In rearing calves, the *blood* and the *colour* seem to be more attended to by breeders in general than the form. (Marshall's *Yorkshire*, vol. ii. p. 203.) The extraordinary prices paid for the best bred bulls and cows, show that this attention has not been without its reward.

Bulls.

The best bulls are either let out for the season, or cows are brought to them at a certain rate per head. The practice of *letting* bulls is said to have originated with Mr Bakewell (Marshall's *Midland Counties*, vol. i. p. 334), who, so far back as 1792, let a bull for 152 guineas, to be used only four months (Parkinson *on Live Stock*, vol. ii. p. 469); and five guineas per cow were about that time commonly paid to him and other eminent breeders.

Age of breeding.

The age at which bulls should begin to be employed, and the number of seasons they should be allowed to serve, as well as the age at which the females should begin to breed, are points regarding which practice is by no means uniform. In the midland counties the bulls are pretty commonly allowed to leap while yearlings, and, if good stock-getters, are kept on as long as they will serve, perhaps till they are 10 or 12 years old. In other places they are employed only three seasons, for the first time at two years old. The females in some instances bring their first calf at the age of two years, but more commonly, perhaps, not till they are a year older; and in some of the Highland districts, where, owing to a want of proper nourishment in their infancy, they are later in reaching their full growth, the females do not often become mothers till they are about four years old.

Period of gestation.

The period of gestation with cows has been found, upon an average of a great number of experiments, to be about 40 weeks; and they seldom bring more than one

Free martins. calf at a birth. When they produce twins, one of them a male and the other a female, the latter, which is called a *free martin*, is commonly considered to be incapable of procreation. Yet there seem to have been well-authenticated instances to the contrary. (*Farmer's Magazine*, vol. vii. p. 462, and vol. viii. p. 466.)

Calves. Though calves are dropped at all seasons of the year, the spring is the most common period; and, except in those districts where the fatting of calves is an object of importance, it is probably the most advantageous time, as the calves, having all the grass season before them, become sufficiently strong for enduring the change to a less agreeable food in the ensuing winter. A calf newly weaned seldom thrives well during that period, unless it is pampered with better food than usually falls to the share of young animals.

Suckling. In Galloway and the Highlands of Scotland the almost invariable practice is to allow the calves to suck the cows, and this commonly as long as the cows give any milk; most of them, indeed, will not give down their milk unless the calf is put to one side of the udder, while the milkmaid draws the teats on the other side; and if the maid gives the least interruption to her rival, the cow punishes the fraud by a blow with her leg, often overturning both the offender and the milking-pail. (*General Report of Scotland*, vol. iii. p. 47.) Where there is not an inclosure for confining the calves when they are put to grass, a muzzle is made for the nose, with iron spikes fastened on it, which prick the cow when the calf attempts to suck at forbidden times, and obliges her to keep it off till the muzzle be removed at the stated periods of milking. But this is too troublesome where many of them are reared, in which case they are kept apart from the cows till the hours of milking.

This natural method of rearing calves is common, at least for a short time, in other parts of Britain. Bull-calves, and sometimes high-bred heifers, are suffered to remain at the teat until they be six, nine, or perhaps twelve months old; letting them run either with their dams, or more frequently, especially when the dairy is an object, with less valuable cows or heifers bought in for the purpose, and, when the intention is fulfilled, sold or fatted; each cow being generally allowed one male calf or two females.

Rearing calves. "The best method of the dairymen is this:—The calves suck a week or a fortnight, *according to their strength* (a good rule); new milk in the pail, a few meals; next new milk and skim-milk mixed, a few meals more; then skim-milk alone, or porridge made with milk, water, ground oats, &c. and sometimes oil-cake, until cheese-making commence; after which, whey porridge, or sweet whey, in the field; being careful to house them in the night, until warm weather be confirmed." (Marshall's *Midland Counties*, vol. i. p. 338.)

Fed from a pail. This method of suckling is not, however, free from objection; and, in the ordinary practice of rearing calves, it is held to be a preferable plan to begin at once to learn them to drink from a pail. The calf that is fed from the teat must depend upon the milk of its dam, however scanty or irregular it may be; whereas, when fed from a dish, the quantity can be regulated according to its age; and various substitutes may be resorted to, by which a part of the milk is saved for other purposes, or a greater number of calves reared upon the same quantity. (*General Report of Scotland*, vol. iii. p. 51.) Yet it would seem to be a good practice to allow calves to suck for a few days at first, if there was no inconvenience to be apprehended both to themselves and their dams from the separation afterwards.

Quantity of milk allowed. When fed from the pail, the average allowance to a calf is about two imperial wine gallons of milk daily for 12 or 13 weeks; at first fresh milk as it is drawn from the cow, and afterwards skim-milk. But after it is three or four weeks old, a great variety of substitutes for milk are used in different places, of which linseed, oil-cake, meal, and turnips, are the most common. The practice, however, varies so much, no particular substitute being in general use, nor the quantity, nor the time of giving it, accurately determined, that it would be of no use to go into details here. For the feeding and treatment of fattening calves, see Dairy.

Castration. It is a rule, applicable to all kinds of live stock, to perform castration, where that is to be done, while the animals are yet very young, and just so strong as to endure this severe operation without any great danger of its proving fatal. The males, accordingly, are cut commonly when about a month old, and the females at the age of from one to three months; but in Galloway, where more heifers are *spayed* than perhaps in all the island besides, this is seldom done till they are about a year old.

Young cattle. The treatment of young cattle from the time they are separated from their dams, or able to subsist on the common food of the other stock, must entirely depend upon the circumstances of the farm on which they are reared. In summer their pasture is often coarse, but abundant; and in winter all good breeders give them an allowance of succulent food along with their dry fodder. The following description is not less applicable to the best practice in the rearing of all cattle bred on arable land, than to the *short-horns*:—

"The first winter they have hay and turnips; the following summer, coarse pasture; the second winter, straw in the fold-yard, and a few turnips once a day, in an adjoining field, just sufficient to prevent the straw from binding them too much; the next summer, tolerably good pasture; and the third winter, as many turnips as they can eat, and in every respect treated as fatting cattle." (Culley *on Live Stock*, p. 47.) The only difference is, that, where straw is in great abundance, the cattle sometimes do not eat their turnips on the fields, but in the fold-yard. In those situations where turnips cannot be extensively cultivated, or where cattle are sold for grazing instead of being fattened, a smaller allowance of turnips the third winter is made to suffice.

3. *Fatting.*

Different kinds of food used in fatting cattle. Cattle are fatted on grass in summer, commonly on pastures, but in a few instances on herbage cut and consumed in feeding-houses or fold-yards; and in winter by far the greater number are fatted on turnips, along with hay or straw. Oil-cake, carrots, potatoes, and other articles of food, are used occasionally, and in particular districts; oil-cake chiefly for feeding the larger animals; but few comparatively are fatted on any of these without the addition of turnips of one or other of the varieties formerly mentioned. See Sect. VI. A considerable number of cattle are also fatted on the offals of distilleries, when working from corn; a source of supply, the frequent interruption of which, till of late, was much felt in those situations where the soil does not permit the extensive cultivation of turnips.

Given in houses or fold-yards. It is seldom or never the practice of the best managers to fatten cattle with roots or other winter food on the field during that season, but to confine them to houses or fold-yards, where they are well littered, regularly fed, not liable to be disturbed, and sheltered from the inclemency of the weather, and where the manure they make is an object of very considerable importance, and of much greater value than if it were dropped at random over a whole field.

Age of fatting.

The age at which cattle are fatted depends upon the manner in which they have been reared, upon the properties of the breed in regard to a propensity to fatten earlier or later in life, and on the circumstances of their being employed in breeding, in labour, for the dairy, or reared solely for the butcher. In the latter case, the most improved breeds are fit for the shambles when about three years old, and very few of any large breed are kept more than a year longer. As to cows and working oxen, the age of fatting must necessarily be more indefinite; in most instances the latter are put up to feed after working three years, or in the seventh or eighth year of their age.

In general it may be said that the small breeds of cattle are fattened on pastures, though sometimes finished off on a few weeks' turnips; and that large cattle, at least in the north, are chiefly fatted in stalls or fold-yards, by means of turnips and the other articles before mentioned.

Stall-feeding.

Stall-feeding is the most common, and, when judiciously conducted, probably the most eligible method in regard to the cattle themselves, the economy of food, and the expense of farm-buildings. The small shed and fold-yard, called a *hammel*, are used only for the larger breeds; but they do not seem well calculated for an extensive system of fatting by those who do not breed, but purchase stock every year from different parts. See Chap. I. Sect. II.

Cattle trade.

Cattle, it is well known, have long been the staple produce of Scotland; and since the union of South and North Britain, immense numbers have been carried every year to the feeding pastures and markets of England. But besides this transportation, so beneficial to both parts of the island, cattle often change their pastures and their owners before leaving Scotland, according to arrangements which, though not conducted with all the uniformity of system, are found to be very advantageous to the individuals concerned, and ultimately to the public at large.

"The Highland cattle often pass through three different hands, or more, before they come to the butcher. They are improved at every stage by a greater quantity and better quality of food, instead of being suddenly transported from poor to rich feeding; and while each successive owner applies his produce to the best advantage, and receives a suitable return according to its value, from the advance of price, the consumer at last purchases his beef cheaper, and of a better quality, than if the cattle had been sent to the shambles from any of the intermediate stages.

"The West Highland cattle make this progress oftener than the larger cattle of the north-eastern counties. Many of them are brought to Dumbartonshire and other places at the age of two years and two years and a half, wintered on course pastures, with a small allowance of bog-hay or straw, and moved to lower grounds next summer. They are then driven farther south, where they get turnips in straw-yards through the following winter, and in April are in high condition for early grass, upon which they make themselves fat in the month of June.

"The larger varieties of the north-eastern counties do not leave the breeder at so early an age. They are seldom brought to market till they are three or three years and a half old, and then frequently in good condition for being fattened, either on grass or turnips. A great many of the Aberdeenshire cattle are bought for the straw-yards of the southern counties, get a few turnips through winter and spring, and are either driven to England in April, or fattened at home in the course of the ensuing summer. The Fife cattle, like the other breeds of the Lowlands, are generally sold to the graziers at three years old, having got a liberal allowance of turnips during the preceding winter." (*General Report of Scotland*, vol. iii. p. 84.)

Desiderata.

Notwithstanding the high degree of perfection to which some breeds of cattle have been brought in England, and the great attention that is paid by the most eminent breeders to every part of their management, several interesting points are not by any means clearly ascertained. Much certainly remains to be known regarding the nutriment afforded by different kinds of herbage and roots,—the quantity of food consumed by different breeds, in proportion as well to their weight at the time as to the ratio of their increase,—and the propriety of preferring large or small animals in any given circumstances. Even with regard to the degree of improvement made by fatting cattle generally, from the consumption of a given weight of roots or herbage, no great accuracy is commonly attempted; machines for weighing the cattle themselves and their food, from time to time, not being yet in general use in any part of Britain.

SECT. III. SHEEP.

Varieties of sheep numerous.

This species being still more than cattle exposed to all the influences of soil and climate, displays a much greater variety in form, size, and general properties. In different counties, though the breed be originally the same, a very perceptible difference is found in all these respects; and there are not unfrequently considerable variations among the flocks of the same district, even those of contiguous farms. Yet in other situations, where rich food is abundantly supplied at all times of the year, sheep have been more highly improved than any other animals; and the breeds most esteemed for the arable land of Britain are in a great measure the creatures of the industry and sagacity of man. Hardly any two animals are more unlike than the small dun-faced sheep, supposed to be the most ancient of the kind in Britain, and the Leicester or Dishley male, whose every point must be exactly formed according to an established model of symmetry and usefulness.

The various breeds of sheep, and the modes of management, almost as numerous as these varieties, would require a much larger space for their description than it is possible to allot to it in a section of this article.

Mode of classification.

According to one writer (Culley *on Live Stock*, p. 102), there are fourteen different breeds of sheep in Great Britain, all of them sufficiently distinguished by their horns, or by being hornless, by the colour of their faces and legs, and by the length and quality of their wool. To these a later writer adds two varieties more (Dickson's *Practical Agriculture*, vol. ii. p. 1135); but a third work, still more recent (Parkinson *on Live Stock*, vol. i. p. 249), enumerates no fewer than thirty-seven breeds, to each of which are assigned one or more characteristic peculiarities. This great diversity renders it necessary to decline a particular description of each: perhaps the most eligible mode of classification would be, to consider separately those races which are best adapted to inclosed arable land; those which occupy green hills, downs, and other tracts of moderate elevation; and, finally, such as inhabit the higher hills and mountains. On the first description of land every sort of practicable improvement may be effected, though there the carcass has hitherto been the chief object; on the second the carcass is smaller, but the wool generally finer,—and it is probably with such sheep that the greatest improvements ought to be attempted on the fleece; and on the last division the breeds are necessarily small and hardy, and, in regard to form and general properties, still almost in a state of nature. The improvement of sheep must mainly depend on the circumstances of every district, in regard to the food and shelter it affords them; and it is only where these indispensable requisites are abundantly provided by nature, or by human industry, that the most skilful management can be successful. The sheep of the rugged heathy mountains of the Highlands of Scotland must ever retain the form, the size, and the habits which the uncontrollable influence of their situation has impressed on them.

But this mode of classification is more applicable to the general management adopted on the several sorts of land, than to the present breeds themselves, which are found intermixed in every district, and often even on the same field. We shall therefore in this, as in the two former sections, describe the distinguishing characteristics of the principal breeds as concisely as possible.

There is, however, in the case of sheep, as of all the other kinds of live stock, a certain form,—a sort of standard established by experience and observation of the best individuals,—to which it is wished that all the breeds of this species should approach. Mr Culley, to whom we have so often referred, as being by far the most skilful of our writers on live stock, thus describes the best form of a ram:—

Form of the male.

"His head should be fine and small, his nostrils wide and expanded, his eyes prominent and rather bold or daring, ears thin, his collar full from his breast and shoulders, but tapering gradually all the way to where the neck and head join, which should be very fine and graceful, being perfectly free from any coarse leather hanging down; the shoulders broad and full, which must at the same time join so easy to the collar forward, and chine backward, as to leave not the least hollow in either place; the mutton upon his arm, or fore thigh, must come quite to the knee; his legs upright, with a clean, fine bone, being equally clear from superfluous skin and coarse hairy wool from the knee and hough downwards; the breast broad and well forward, which will keep his fore legs at a proper wideness; his girth or chest full and deep, and instead of a hollow behind the shoulders, that part by some called the fore flank should be quite full; the back and loins broad, flat, and straight, from which the ribs must rise with a fine circular arch; his belly straight, the quarters long and full, with the mutton quite down to the hough, which should neither stand in nor out; his twist deep, wide, and full, which, with the broad breast, will keep his four legs open and upright; the whole body covered with a thin pelt, and that with fine, bright, soft wool.

"The nearer any breed of sheep comes up to the above description, the nearer they approach towards excellence of form." (Culley *on Live Stock*, p. 103.)

1. *Breeds.*

Breeds.

The sheep suited to arable land, in addition to such properties as are common in some degree to all the different breeds, must evidently be distinguished for their quietness and docility,—habits which, though gradually acquired and established by means of careful treatment, are more obvious, and may be more certainly depended on, in some breeds than in others. These properties are not only valuable for the sake of the fences by which the sheep are confined, but as a proof of the aptitude of the animals to acquire flesh in proportion to the food they consume.

The long-woolled large breeds (the varieties usually preferred on good grass-lands) differ much in form and size, and in their fatting quality, as well as in the weight of their fleeces. The principal are, the *Lincoln*, the *Teeswater*, and the *Dishley* or *New Leicester*.

In some instances, with the Lincolns in particular, wool seems to be an object paramount even to the carcass; with the breeders of the Leicesters, on the other hand, the carcass has always engaged the greatest attention: but neither form nor fleece separately is a legitimate ground of preference, the most valuable sheep being that which returns, for the food it consumes, the greatest marketable value of produce.

Lincolns.

The *Lincolnshire breed* have no horns; the face is white, and the carcass long and thin, the ewes weighing from 14 to 20 lb., and the three-year-old wethers from 20 to 30 lb. per quarter. They have thick, rough, white legs, bones large, pelts thick, and wool long,—from 10 to 18 inches,—weighing from 8 to 14 lb. per fleece, and covering a slow-feeding, coarse-grained carcass of mutton.

This kind of sheep cannot be made fat at an early age, except upon the richest land, such as Romney-marsh, and the rich marshes of Lincolnshire; yet the prodigious weight of wool which is shorn from them every year is an inducement to the occupiers of the marsh-land to give great prices to the breeders for their hogs or yearlings; and though the buyers must keep them two years more before they get them fit for market, they have three clips of wool in the mean time, which of itself pays them well in those rich marshes. Not only the midland counties, but also Yorkshire, Durham, and Northumberland, can send their long-woolled sheep to market at two years old, fatter in general than Lincolnshire can at three. Yet this breed, and its subvarieties, are spread through many of the English counties.

Teeswater.

The *Teeswater* breed differs from the Lincolnshire in their wool not being so long and heavy; in standing upon higher, though finer-boned legs, supporting a thicker, firmer, heavier carcass, much wider upon their backs and sides; and in affording a fatter and finer-grained carcass of mutton, the two-year-old wethers weighing from 25 to 35 lb. per quarter. Some particular ones, at four years old, have been fed to 55 lb. and upwards.

There is little doubt that the Teeswater sheep were originally bred from the same stock as the Lincolnshire, but, by attending to size rather than to wool, and constantly pursuing that object, they have become a different variety of the same original breed.

"The present fashionable breed is smaller than the original species, but they are still considerably larger and fuller of *bone* than the Midland breed. They bear an analogy to the short-horned breed of cattle, as those of the Midland counties do to the long-horned. They are not so compact, nor so complete in their form, as the Leicestershire sheep; nevertheless, the excellency of their flesh and fatting quality is not doubted, and their wool still remains of a superior staple. For the banks of the Tees, or any other rich fat-land country, they may be singularly excellent." (Marshall's *Yorkshire*, vol. ii. p. 221.) Rams of this kind have been employed of late in Northumberland and Berwickshire, in crossing ewes of the Leicester breed, but with what success there has not yet been time to determine.

New Leicester.

The *Dishley* or *New Leicester* breed is distinguished from other long-woolled breeds by their clean heads, straight, broad, flat backs, round, barrel-like bodies, very fine small bones, thin pelts, and inclination to make fat at an early age. This last property is most probably owing to the before-specified qualities, and which, from long experience and observation, there is reason to believe, extends through every species of domestic animals. The Dishley breed is not only peculiar for its mutton being fat, but also for the fineness of the grain and superior flavour, above all other large long-woolled sheep, so as to fetch nearly as good a price, in many markets, as the mutton of the small Highland and short-woolled breeds. The weight of ewes three or four years old is from 18 to 26 lb. a quarter, and of wethers two years old from 20 to 30 lb. The wool, on an average, is from 6 to 8 lb. a fleece. See Plate XVI.

Devonshire Nots. A fourth hornless variety of long-woolled sheep is the *Devonshire Nots*, having white faces and legs, thick necks, narrow backs, and back-bone high; the sides good, legs short, and the bones large; weight much the same as the Leicesters, wool heavier, but coarser. In the same county there is a small breed of long-woolled sheep, known by

Exmoor. the name of the *Exmoor* sheep, from the place where they are chiefly bred. They are horned, with white faces and legs, and peculiarly delicate in bone, neck, and head; but the form of the carcass is not good, being narrow and flat-sided; the weight of the quarters and of the fleece about two-thirds that of the former variety.

The shorter-woolled kinds, and such as, from their size and form, seem well suited to hilly and inferior pastures, are also numerous. Generally speaking, they are too restless for inclosed arable land on the one hand, and not sufficiently hardy for heathy, mountainous districts on the other. To this class belong the breeds of *Dorset*, *Hereford*, *Sussex*, *Norfolk*, and *Cheviot*.

Dorsets. The *Dorsetshire* sheep are mostly horned, white-faced, stand upon high, small, white legs, and are long and thin in the carcass. The wethers, three years and a half old, weigh from 16 to 20 lb. a quarter. The wool is fine and short, from 3 to 4 lb. a fleece. The mutton is fine-grained and well flavoured.

This breed has the peculiar property of producing lambs at almost any period of the year, even so early as September and October. They are particularly valued for supplying London and other great towns with house-lamb, which is brought to market by Christmas, or sooner if wanted; and after that a constant and regular supply is kept up all the winter.

Wilts. According to Mr Culley, the *Wiltshire* sheep are a variety of this breed, which, by attention to size, have got considerably more weight, viz. from 20 to 28 lb. a quarter. These, in general, have no wool upon their bellies, which gives them a very uncouth appearance.

"The variations of this breed are spread through many of the southern counties, as well as many in the west, viz. Gloucestershire, Worcestershire, Herefordshire, &c. Though some of them are very different from the Dorsetshire, yet they are, I apprehend, only variations of this breed, by crossing with different tups; and which variations continue northward until they are lost amongst those of the Lincolnshire breed."

Herefords. The *Herefordshire* sheep are known by their want of horns, and their having white legs and faces, the wool growing close to their eyes. The carcass is tolerably well formed, weighing from 10 to 18 lb. a quarter, and bearing very fine short wool, from 1½ to 2½ lb. a fleece: the mutton is excellent.

Cotting. The store or keeping sheep of this breed are put into cots at night, winter and summer, and in winter foddered in racks with peas-straw, barley-straw, &c. and in very bad weather with hay. These cots are low buildings, quite covered over, and made to contain from 100 to 500 sheep, according to the size of the farm or flock kept. The true Herefordshire breed are frequently called *Ryeland* sheep, from the land formerly being thought capable of producing no better grain than rye, but which now yields every kind of grain. See Plate XVI.

South Downs. The *South Down* sheep are without horns; they have grey faces and legs, fine bones, long small necks; are low before, high on the shoulder, and light in the fore quarter; the sides are good, and the loin tolerably broad, backbone too high, the thigh full, and twist good. The fleece is very short and fine, weighing from 2½ to 3 lb. The average weight of two-year old wethers is about 18 lb. per quarter, the mutton fine in the grain, and of an excellent flavour. These sheep have been brought to a high state of improvement by Mr Elman of Glynd, and other intelligent breeders. They prevail in Sussex, on very dry chalky downs producing short fine herbage. See Plate XVI.

In the *Norfolk* sheep the face is black, horns large and spiral; the carcass is very small, long, thin, and weak, with narrow chines, weighing from 16 to 20 lb. per quarter; and they have very long dark or grey legs, and large bones. The wool is short and fine, from 1½ to 2 lb. per fleece.

Norfolks. This race have a voracious appetite, and a restless and unquiet disposition, which makes it difficult to keep them in any other than the largest sheep-walks or commons. They prevail most in Norfolk and Suffolk, and seem to have been retained solely for the purpose of folding; as it does not appear they have any other good property to recommend them besides being good travellers, for which they seem well adapted, from their very long legs and light lean carcasses.

Cheviots. The *Cheviot* breed are without horns, the head bare and clean, with jaws of a good length, faces and legs white. See Plate XIV. The body is long, but the fore quarters generally want depth in the breast, and breadth both there and on the chine, though in these respects great improvement has been made of late. They have fine, clean, small-boned legs, well covered with wool to the hough. The weight of their carcass, when fat, is from 12 to 18 lb. per quarter; their fleece, which is of a medium length and fineness, weighs about 3 lb. on an average.

Though these are the general characters of the pure Cheviot breed, many have grey or dun spots on their faces and legs, especially on the borders of their native district, where they have intermixed with their black-faced neighbours. On the lower hills, at the extremity of the Cheviot range, they have been frequently crossed with the Leicesters, of which several flocks, originally Cheviot, have now a good deal both of the form and fleece.

The best kind of these sheep are certainly a very good mountain stock, where the pasture is mostly green sward, or contains a large portion of that kind of herbage, which is the case with all the hills around Cheviot where those sheep are bred. Large flocks of them have been sent to the Highlands of Scotland, where they have succeeded so well as to encourage the establishment of new colonies; yet they are by no means so hardy as the heath or black-faced kind, which they have in many instances supplanted.

Heath breed. Of those races of sheep that range over the mountainous districts of Britain, the most numerous, and the one probably best adapted to such situations, is the *Heath* breed, distinguished by its large spiral horns, black faces and legs, fierce, wild-looking eyes, and short, firm carcasses covered with long, open, coarse wool. Their weight is from 10 to 16 lb. a quarter, and they carry from 3 to 4 lb. of wool each. They are seldom fed until they are three, four, or five years old, when they fatten well, and give excellent mutton and highly flavoured gravy. Different varieties of these sheep are to be found in all the western counties of England and Scotland, from Yorkshire northwards; and they want nothing but a finer fleece to render them the most valuable upland sheep in Britain. See Plate XV.

Herdwicks. The *Herdwick* sheep are peculiar to that rocky, mountainous district, at the head of the Duddon and Esk rivers, in the county of Cumberland. They are without horns, have speckled faces and legs, wool short, weighing from 2 to 2½ lb. per sheep, which, though coarser than that of any of the other short-woolled breeds, is yet much finer than the wool of the heath sheep. The mountains upon which the Herdwicks are bred, and also the stock itself, have, time immemorial, been farmed out to herds, and from this circumstance their name is derived.

Dun-faced. The *Dun-faced* breed, said to have been imported into Scotland from Denmark or Norway at a very early period, still exists in most of the counties to the north of the Frith of Forth, though only in very small flocks. Of this ancient race there are now several varieties, produced by peculiarities of situation and different modes of management, and by occasional intermixture with other breeds. We may therefore distinguish the sheep of the mainland of Scotland from those of the Hebrides and of the northern islands of Orkney and Zetland.

Hebrides. "The Hebridean sheep is the smallest animal of its kind. It is of a thin, lank shape, and has usually straight, short horns. The face and legs are white, the tail very short, and the wool of various colours, sometimes of a bluish grey, brown, or deep russet, and sometimes all these colours meet in the fleece of one animal. Where the pasture and management are favourable, the wool is very fine, resembling in softness that of Shetland; but in other parts of the same islands the wool is stunted and coarse, the animal sickly and puny, and frequently carries four, or even six horns."

"The average weight of this poor breed, even when fat, is only 5 or 5½ lb. per quarter, or nearly about 20 lb. per sheep. It is often much less, only amounting to 15 or 16 lb.; and the price of the animal's carcass, skin and all, is from 10s. to 14s. We have seen fat wedders sold in the Long Island at 7s. a head, and ewes at 5s. or 6s. The quantity of wool which the fleece yields is equally contemptible with the weight of the carcass. It rarely exceeds 1 lb. weight, and is often short of even half that quantity. The quality of the wool is different on different parts of the body; and inattention to separating the fine from the coarse renders the cloth made in the Hebrides very unequal and precarious in its texture. The average value of a fleece of this aboriginal Hebridean breed is from 8d. to 1s. sterling. From this account it is plain that the breed in question has every chance of being speedily extirpated." (Macdonald's *Report of the Hebrides*, p. 447.)

Zetland. In the Zetland Isles it would appear that there are two varieties; one of which is considered to be the native race, and carries very fine wool; but the number of these is much diminished, and in some places they have been entirely supplanted by foreign breeds. The other variety carries coarse wool above, and soft, fine wool below. "They have three different successions of wool yearly, two of which resemble long hair more than wool, and are termed by the common people *fors* and *scudda*. When the wool begins to loosen in the roots, which generally happens about the month of February, the hairs or *scudda* spring up; and when the wool is carefully plucked off, the tough hairs continue fast, until the new wool grows up about a quarter of an inch in length, when they gradually wear off; and when the new fleece has acquired about two months' growth, the rough hairs, termed *fors*, spring up, and keep root, until the proper season for pulling it arrives, when it is plucked off along with the wool, and separated from it at dressing the fleece, by an operation called *forsing*. The *scudda* remains upon the skin of the animal, as if it were a thick coat; a fence against the inclemency of the seasons, which provident nature has furnished for supplying the want of the fleece.

"The wool is of various colours. The silver grey is thought to be the finest; but the black, the white, the *mourat* or brown, is very little inferior; though the pure white is certainly the most valuable for all the finer purposes in which combing wool can be used."[1]

Mainland. In the northern part of Kincardineshire, as well as in most other of the northern counties, there is still a remnant of this ancient race, distinguished by the yellow colour of the face and legs, and by the dishevelled texture of the fleece, which consists in part of coarse, and in part of remarkably fine wool. Their average weight in that county is from 7 to 9 lb. a quarter, and the mutton is remarkably delicate and highly flavoured. (*Kincardineshire Report*, p. 385.)

Merinos. The last variety we shall mention is the Spanish or *Merino* breed, bearing the finest wool of the sheep species. The males usually have horns of a middle size, but the females are frequently without horns; the faces and legs are white, the legs rather long, but the bones fine. The average weight per quarter of a tolerably fat ram is about 17 lb., and that of ewes about 11 lb. The shape of this race is far from being perfect, according to the ideas of English breeders, with whom symmetry of proportion constitutes a principal criterion of excellence. The *throatiness*, or pendulous skin beneath the throat, which is usually accompanied with a sinking or hollow in the neck, presents a most offensive appearance, though it is much esteemed in Spain, as denoting both a tendency to fine wool and a heavy fleece. Yet the Spanish sheep are level on the back and behind the shoulders; and Lord Somerville has proved, that there is no reason to conclude that deformity in shape is in any degree necessary to the production of fine wool.

Fleece. The fleece of the Merino sheep weighs upon an average from 3 to 5 lb. In colour it is unlike that of any English breed. There is on the surface of the best Spanish fleeces a dark brown tinge, approaching almost to a black, which is formed by dust adhering to the greasy properties of its pile; and the contrast between this tinge and the rich white colour below, as well as that rosy hue of the skin which denotes high proof, at first sight excites much surprise. The harder the fleece is, the more it resists any external pressure of the hand, the more close and fine will be the wool. Here and there indeed a fine pile may be found in an open fleece, though this occurs but rarely. Nothing, however, has tended to render the Merino sheep more unsightly to the English eye than the large tuft of wool which covers the head: it is of a very inferior quality, and classes with what is produced on the hind legs; on which account it does not sort with any of the three qualities, viz. *Refinos* or prime, *Finos* or second best, and *Terceros*, the inferior sort, and consequently is never exported from Spain.

Travelling flocks. The Spanish flocks which yield fine wool are sometimes distinguished by the appellation of *Trashumante*, on account of their travelling from one end of the kingdom to the other, though there are flocks that never travel, with wool equally fine. They are wintered in Estremadura and other warm provinces in the south; and during the summer months they graze on the northern mountains of Castile, Leon, and Asturias.

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[1] Sir John Sinclair *on the Different Breeds of Sheep*, &c.—Appendix, No. 4. (Account of the Shetland Sheep, by Thomas Johnston, p. 79.)

Merinos were first brought into England in 1788, but did not excite much interest before his Majesty's sales, which began in 1804. The desirable object of spreading them widely over the country, and subjecting them to the experiments of the most eminent professional breeders, was greatly promoted by the institution of the Merino Society in 1811; which soon comprehended some of the greatest landholders and the most eminent breeders in the kingdom. See Plate XVII.

It seems to be generally admitted, however, that the wool is somewhat deteriorated since the sheep were brought to this country, whatever improvement may have been made on the carcass. Valuable as the fleece is, our breeders still find that the carcass is the principal object; and their management must therefore be conducted rather with a view to the supply of the butcher than the clothier. There may be something in our climate unfavourable to the growth of fine wool; but the principal cause will probably be found in the mode of feeding, which is in every respect so superior to what they experience in Spain and other parts of the Continent. As a means of improving the wool of our own breeds, it may often be beneficial to cross with the Merinos; but as a separate and distinct race, it is hardly to be expected that they will ever establish themselves upon an extensive scale in this country.

2. *Breeding and Rearing.*

Modes of breeding.

A greater degree of perfection has been attained in the breeding of sheep than in any other species of live stock; and in this branch, in particular, the breeders of England stand higher than those of any other country.

We have therefore purposely deferred the observations which it seems necessary to offer on the different systems of breeding, to this part of our article; though they may apply generally to other species of animals as well as to sheep.

The males and females possessed of the properties the breeder wishes to acquire, may be, 1. of the same family; 2. of the same race, but of different families; or, 3. of different races.

Breeding in-and-in.

The first method is called *breeding in-and-in.* This requires that animals of the nearest relationship should be put together, and is supposed by many to produce a tender, diminutive, and unhealthy progeny. But if a male and female, got by the same sire, were never to be put together, however excellent they might be, a stock that should by any means have become better than others could not be long preserved from deterioration by strangers, nor could it be still further improved by selection. By breeding in the same family for a great many years, Mr Bakewell succeeded in raising his sheep to a degree of perfection which no other fattening animal ever attained in any age or country.

"It is certainly," says Mr Culley, one of the most eminent of his disciples, "from the *best males and females* that the *best breeds* can be obtained or preserved."—"When you can no longer find *better males* than your own, then by all means breed from them, whether horses, neat-cattle, sheep, &c.; for the same rule holds good through every species of domestic animals; but upon no account attempt to breed or cross from worse than your own; for that would be acting in contradiction to common sense, experience, and that well-established rule, '*That best only can beget best,*' or, which is a particular case of a more general rule, viz. '*That like begets like.*'"

This reasoning is opposed by others, who, however, rather deny the premises than dispute the conclusion. It has been contended that there never "did exist an animal without some defect in constitution, in form, or in some other essential quality;" that "this defect, however small it may be at first, will increase in every succeeding generation, and at last predominate to such a degree as to render the breed of little value."—"Mr Bakewell very properly considered a propensity to get fat as the first quality in an animal destined to be the food of man. His successors have carried his principle too far; their stock are become small in size, and tender, produce little wool, and are bad breeders." (Sebright *on improving the Breeds of Domestic Animals*, p. 11, 14.)

It is admitted, however, that *breeding in-and-in* will have the same effect in strengthening the good as the bad properties, and may be beneficial if not carried too far, particularly in fixing any variety that may be thought valuable. And again, the same writer observes, "There may be families so nearly perfect as to go through several generations without sustaining much injury from having been bred *in-and-in*; but a good judge would upon examination point out by what they must ultimately fail, as a mechanic could discover the weakest part of a machine before it gave way." (Sebright *on improving the Breeds of Domestic Animals*, p. 12.)

"But one of the most conclusive arguments that crossing with a different stock is not necessary to secure size, hardiness, &c., is the breed of wild cattle in Chillingham park, in the county of Northumberland. It is well known these cattle have been confined in this park for several hundred years, without any intermixture, and are perhaps the *purest breed* of cattle of any in the kingdom. From their situation and uncontrolled state, they must indisputably have bred from the nearest affinities in every possible degree; yet we find these cattle exceedingly hardy, healthy, and well formed, and their size, as well as colour, and many other particulars and peculiarities, the same as they were five hundred years since." (Culley *on Live Stock*, p. 10.)

Crossing families of the same race.

Notwithstanding all this, it must be admitted that there is a great diversity of opinion among intelligent men respecting the expediency of this mode of breeding, and in most instances, perhaps, a pretty strong prejudice against it. The most common practice therefore is, to breed from different families of the same race. When these have been for some time established in a variety of situations, and have had some slight shades of difference impressed upon them by the influence of different soils and treatment, it is found advantageous to interchange the males, for the purpose of strengthening the excellencies or remedying the defects of each family. Of this advantage Mr Bakewell could not avail himself; but it has been very generally attended to by his successors. Mr Culley for many years continued to hire his rams from Mr Bakewell, at the very time that other breeders were paying a liberal price for the use of his own; and the very same practice is followed by the most skilful breeders at present. In large concerns, two or more *streams of blood* may be kept distinct for several generations, and occasionally intermixed with the happiest effects, by a judicious breeder, without having recourse to other flocks.

Crossing different breeds.

The only other method is, by crossing two distinct breeds or races, one of which possesses the properties which it is wished to acquire, or is free from the defects which it is desirable to remove. This measure can only be recommended when neither of the former methods will answer the purpose. The very distinction of breeds implies a considerable difference among animals in several respects; and although the desirable property be obtained, it may be accompanied by such others as are by no means advantageous to a race destined to occupy a situation which had excluded that property from one of its parents. To cross any mountain breed with Leicester rams, for example, with a view to obtain a propensity to fatten at an early age, would be attended with an enlargement of size, which the mountain pasture could not support; and the progeny would be a mongrel race, not suited to the pastures of either of the parent breeds. If the object be to obtain an enlargement of size, as well as a propensity to fatten, as is the case when Cheviot ewes are crossed with Leicester rams, the progeny will not prosper on the hilly pastures of their dams, and will be equally unprofitable on the better pastures of their sires. But the offspring of this cross succeeds well on those intermediate situations on the skirts of the Cheviot hills, where, though the summer pasture is not rich, there is a portion of low land for producing clover and turnips.

General rules.

In every case where the enlargement of the carcass is the object, the cross breed must be better fed than its smaller parent. The size of the parents should also be but little disproportioned at first; and when some increase has been produced, one or more crosses afterwards may raise the breed to the required size. With these precautions, there is little reason to fear disappointment, provided both parents are well formed. (*General Report of Scotland*, vol. iii. p. 14–18.)

Breeding of males.

Letting.

The breeding of males, still more in this species than in cattle, has long been a separate pursuit; and there are few flocks skilfully managed in which it is not still the practice to have recourse occasionally to rams hired at a high price from those men whose chief attention is devoted to this branch of business. These rams are shown for hire, at certain times and places during the summer, where every one may select such as promise to maintain or improve the particular state of his flock, and at such prices as his means and experience may justify. Two or more individuals frequently join together in the hire of one ram, to which they put the best of their ewes, for the purpose of obtaining superior males for the future service of the rest of their flocks; and in particular cases, when the owner of the ram does not choose to part with him, even for a season, ewes are sent to him to be covered at a certain price per head, superior animals of this class being very seldom sold altogether. Much as this mode of doing business has been reprobated as a monopoly, and much as there may sometimes be of deception in *making up* rams for these shows, all intelligent practical men must agree that there can be no better method of remunerating eminent breeders, and of spreading their improvements most widely, in the shortest period, and at the least possible expense. A single ram thus communicates its valuable properties to a number of flocks, often in distant parts of the country, without distracting the attention of ordinary breeders from their other pursuits. It is a striking instance of the division of labour, which in this, as in other branches, has been productive of the most beneficial results to all concerned, and to the community at large.

Season of breeding.

Management of hill sheep.

Rams and ewes are allowed to copulate earlier or later, according to the prospect of food for their young at the period of parturition,—usually in October and the early part of November; and as the time of gestation with sheep is twenty-one weeks, the lambs are accordingly dropped in March or April. The management of the Leicester breed, equally applicable to all the varieties kept on low arable land, having been detailed at some length in the works already referred to, we shall here give a condensed view of the best practices in regard to the stocks of hilly or mountainous districts, chiefly collected from the skilful management of the breeders of the Cheviot sheep on the borders of South and North Britain.

Copulation.

1. In November the rams are put to the ewes a little earlier or later, according to the prospect of spring food, but seldom before the 8th or 10th of that month. The number of rams required is greater or less, according to the extent of the pasture, and their own age and condition. If the ewes are not spread over an extensive tract, one ram to sixty ewes is generally sufficient. It is usually thought advisable to separate the gimmers (sheep once shorn) from the older ewes, and to send the rams to the latter eight or ten days before they are admitted to the former. Notwithstanding this precaution, which retards their lambing season till the spring is further advanced, ewes which bring their first lamb when two years old, the common period on the best hill farms, are often very bad nurses, and in a late spring lose a great many of their lambs, unless they are put into good condition with turnip before lambing, and get early grass afterwards. This separation, and difference in the time of admitting the rams to the ewes and gimmers, should therefore be always attended to.

Selection of males and females.

2. When a farm under this description of stock has the convenience of a few good inclosures, still more minute attention is paid by skilful managers. It is not sufficient that the rams are carefully selected from perhaps double the number; the ewes also are drawn out and assorted, and such a ram appropriated to each lot as possesses the properties in form or fleece in which the ewes are deficient. In other cases, the best ram and the best lot of ewes are put together. When neither of these arrangements can be adopted, owing to the want of inclosures, it is the practice to send the best rams to the ewes for a few days at first, and those of an inferior description afterwards. In every case, when the farmer employs rams of his own flock, he is careful to have a few of his best ewes covered by a well-formed and fine-woolled ram, for the purpose of obtaining a number of good ram-lambs, for preserving or improving the character of his stock.

Separate classes of a flock.

3. The stock through winter, in a mere breeding farm, consists of ewes and gimmers which should have lambs in spring, ewe-lambs or hogs, and a few young and old rams. All these are sometimes allowed to pasture promiscuously, but on the farms around Cheviot the ewes and ewe-hogs are kept separate, and the latter are either put on rough pastures which have been lightly stocked in the latter end of summer, or get a few turnips once a day, in addition to the remains of their summer pasture. The most effectual preventive of the desolating distempers to which sheep of this age are liable is turnips; and though they should never taste them afterwards, a small quantity is frequently given them during their first winter. After the rams have been separated from the ewes, they are usually indulged with the same feeding as the hogs.

4. The ewes, during winter, are seldom allowed any other food than what their summer pasture affords, except that a small part of it may sometimes be but lightly eaten, and reserved as a resource against severe storms. When these occur, however, as they often do in the Cheviot district, there is little dependence on any other food than hay. When the snow is so deep as completely to cover the herbage, about two stones avoirdupois of hay are allowed to a score of sheep daily, and it is laid down morning and evening in small parcels on any sheltered spot near the houses, or under the shelter of *stells* or clumps of trees, on different parts of the farm.

5. In March, the ewes, at least the gimmers or young

ewes, are commonly allowed a few turnips once a day, on farms on which there is any extent of arable land, which are either carted to their pastures, or eaten on the ground by bringing the sheep to the turnip-field through the night. A part of the field, in the latter case, is cut off by nets or by hurdles, which inclose the sheep in the same way as if they were intended for fattening. When they are ready to drop their lambs, they are no longer kept on the turnip-field, but get what turnips may be left, on their pastures. It is seldom, however, that the turnips last so long, though it is desirable to have a few remaining, to be given to the weakest ewes, or to such as have twins, in a separate inclosure.

Udder-locking.

6. A few days before the time of lambing, the ewes are collected for the purpose of being *udder-locked*. The sheep are raised upon their buttocks, their backs next to the operator, who then bends forward and plucks off the *locks* of wool growing on or near the udders, for the purpose of giving free access to the expected lambs. At the same time he ascertains the condition of the ewes, and marks such as do not appear to be in lamb, which may then be separated from the others. This operation is not without danger, and several premature births are usually the consequence. It is therefore not so general a practice as it was formerly, though still a common one on many, if not on most farms.

7. On those farms where the hogs have been allowed to pasture promiscuously with the ewes, which is seldom permitted on the Cheviot hills, a separation should always take place at the commencement of the lambing season; and the lowest and finest part of the pasture ought to be exclusively appropriated to the nursing ewes.

Lambing.

8. The ewes begin to drop their lambs in the first or second week of April, according to the time at which the rams were admitted; and such as have twins generally lamb among the first of the flock. At this season the most constant attention is indispensable on the part of the shepherds, both to the ewes in labour and to the newly dropped lambs. Though the Cheviot ewes are not so liable to losses in parturition as some larger breeds which are in higher condition, and though they make good nurses, unless they are very lean, and their food scanty, yet among a large flock there are always a number that need assistance in lambing, and in a late spring not a few that have not milk sufficient for their lambs, particularly among the gimmers or young ewes. A careful shepherd at this time always carries a bottle of milk along with him, which he drops from his own mouth into that of the lamb that may need it,—brings the ewes that have little milk to a better pasture, or to turnips,—and confines such as have forsaken their lambs in a small pen, or *barrack* as it is called, temporarily erected in some part of the farm-steading. The same confinement is necessary when it is wished to make a ewe that has lost her own lamb nurse that of another ewe that has had twins, or that has perished in lambing, or is from any other cause incapable of rearing her lamb. The ewe, after being shut up for a few hours with the stranger lamb, usually admits it to the teat, and ever after treats it as her own; though sometimes a little deception is necessary, such as covering the stranger with the skin of her own lamb. At this important season, an inclosure of rich early grass, near the shepherd's cottage, is of vast advantage. Thither he carries the ewes and twins,—such as have little milk,—those that have been induced to adopt another's offspring,—and, generally, all that need to be frequently inspected, and are in want of better treatment than the rest of the flock.

Castration.

9. As soon as the weather is favourable, after a considerable number of the ewes have lambed, they are collected into a fold, and all the male lambs are castrated, except a few of the best, reserved for rams. The ewe-lambs are never spayed. It is advisable to perform this severe but necessary operation when the lambs are but a few days old, if the weather will permit, instead of delaying till the end of the lambing season, as is still the case in some instances.

Late lambs.

10. Towards the end of the lambing season the ewes that have not yet dropped lambs are separated from the flock and kept by themselves, that they may be more under the eye of the shepherd, than if scattered over all the pasture. It is desirable to allow them finer grass for a few weeks after lambing, that their lambs may come to be nearly equal to the rest of the flock when weaned; or, if they are too late for this, that they may get ready for the butcher by the month of August, beyond which period the ewes must be much injured by suckling them.

Washing.

11. When the wool has risen sufficiently (and the proper time is easily known by the appearance of a new growth), the barren sheep are brought to the washing-pool. Sometimes they are hand-washed by men, who stand in the pool and have the sheep forced towards them singly; but more commonly the Cheviot sheep, especially if the flock be numerous, are compelled to leap into the pool in a body for three or four times successively; and it is desirable that they should have room to swim a little, and come out on a green low bank on the opposite side. After being washed, the sheep are preserved as far as possible from rubbing against earthen dikes or banks, and from lying down on any dirty spot which might soil their wool.

Shearing.

There are two methods of shearing; in the one, the operator sits on the floor or on the ground, lays the sheep on its back between his knees, begins with the belly, and afterwards, having tied the animal's legs, proceeds very expeditiously, at the rate of four or five sheep in the hour, or from forty to fifty a day. This is the common method of shearing Cheviot sheep. In the other, which is a much more perfect method, the shearer raises the animal on its buttocks, and, beginning at the neck, clips in a circular direction from the belly to the backbone, for some time with one hand, and then on the opposite side with the other. The fleeces are neatly lapped up, after any filthy spots have been cut off, the shorn side outwards, beginning at the breech-wool, and using that of the neck and shoulders as a bandage. Before the shorn sheep are turned out to pasture, they are marked, commonly with the owner's initials, by a stamp, or *boost* in provincial language, dipped in tar heated to a thin fluid state; and it is not unusual to place this mark on different parts of the body, according to the sheep's age.

Weaning lambs.

12. The principal markets for Cheviot lambs in the south of Scotland are held in the month of July, the first on the fifth of July; so that the lambs may commonly be weaned when about three months old, and sometimes sooner. When the ewes are gathered to be washed or shorn, the ewe-lambs to be kept for supplying the place of the old ewes, annually sold, are stamped in the same way as the ewes. The store-lambs are sent to some clean grassy pasture for a few weeks; and where the farm does not afford this accommodation, they must be *summered*, as it is called, at a distance. Several farms near Cheviot, and on the Lammermuir hills in Berwickshire, are appropriated to this purpose, the owner of the lambs paying so much a head for six or eight weeks. In the mean time the ewe-hogs, or gimmers, as they are denominated after shearing, have joined the ewe stock; and the lambs, when brought home, go to the pasture which they had occupied. Wherever they may be kept in winter, it is always desirable to allow them a few turnips, along with a full bite of coarse herbage.

Milking ewes.

13. When the lambs had been separated from the ewes, it was formerly the practice to milk the ewes for six or eight weeks or more; and this most objectionable management is still continued by several farmers. The most skilful store-masters, however, have either laid aside milking, unless for a few days, or have shortened the period to two or three weeks. The value of the milk for eight weeks will not exceed from one shilling to one shilling and sixpence a head, and the sheep are injured to at least three times that amount, independent of accidents at the milking fold. The cream is separated from the ewe-milk, and made into butter for smearing, and the milk itself mixed with cow-milk, and converted into cheese.

Drafting out old ewes.

14. The next object of attention is the drafting of the old ewes to be sold in September or October. Their age, on the lower hills, is usually four years and a half, or they are disposed of after having reared lambs for three years. In some situations they are kept on till a year older; but when they are purchased, as they usually are, to be kept another year on lower grounds, it is commonly for the interest of the store-farmer to sell them when still in their full vigour. Skilful managers do not content themselves with drafting them merely according to age; and as there is no disadvantage in keeping a few of the best another year, they take this opportunity of getting rid of such of the flock of other ages as are not of good shapes, or are otherwise objectionable. As soon as the ewes to be disposed of are drawn from the flock, they are kept by themselves on better pasture, if the circumstances of the farm will admit of it. Sometimes they are carried on till they are fattened, and turnips are often purchased for them at a distance. When this is the case, it is not thought advisable to keep them longer than till between Christmas and Candlemas, as an old ewe does not improve like a wether in the spring months.

Salving.

15. The last operation of the season is salving or smearing, which is usually performed towards the end of October or beginning of November, before the rams are sent to the ewes. The most common materials are butter and tar, mixed in different proportions; a greater proportion of tar being employed for the hogs or young sheep than for the older ones. The butter is slowly melted and poured upon the tar, and the mixture is constantly stirred till it becomes cool enough for use. The wool is accurately parted into rows from the head to the tail of the animal, and the salve is carefully spread upon the skin with the point of the finger, at the bottom of each row. The object of this operation is to destroy vermin, to prevent cutaneous diseases, and to promote the warmth and comfort of the animal during the storms of the ensuing winter. It is not necessary with sheep kept on low grounds, and well fed during winter; and it may be occasionally omitted for one season, particularly with old sheep, without material injury; but notwithstanding the ridicule that speculative writers have attempted to throw upon the practice, it is almost universally considered necessary and beneficial, on high exposed situations, by the store-farmers of the border hills. (*General Report of Scotland*, vol. iii.) In consequence of the great depression of late in the price of tarred wool, however, various attempts have been made to use in its stead other mixtures, which are laid on the sheep either in a liquid form, such as tobacco liquor and turpentine, or of the consistency of a salve, which is composed of oil and butter or tallow, with a mixture of turpentine. There has not been sufficient experience to ascertain whether tar can be altogether dispensed with in the case of the mountain flocks; but in general it is now used much more sparingly than formerly.

Besides those general rules of management which are applicable, with slight modifications, to all the numerous breeds of sheep, there are practices more or less extensively followed in particular districts, or with particular breeds, the most important of which are *cotting* and *folding*. In describing the Herefordshire sheep, the practice of keeping them in cots through the night has been already noticed; and a similar one is followed in some parts of the Highlands of Scotland with the small dun-faced flocks of that district.

Folding.

Folding is adopted as a regular part of the system of management in several counties of England, for the purpose of turning the dung of the animals to the best account in promoting the fertility of their arable land. The same thing has been done to a small extent in Scotland, but it forms no part of general management there, and is confined to those situations where, from the want of inclosures, it is necessary to the protection of the crops, and to small patches of what is still in the ancient state of *outfield*, as a preparation for corn.

Folding breeds.

The sheep best adapted to the fold are those of the more active short-woolled varieties, such as the Norfolk, Wiltshire, and South Down breeds; the heavy long-woolled kinds being less hardy, and some of them, as the Leicesters, much too valuable for a mode of treatment that converts them into dung carriers. The following calculation will show, that though in open lands the practice may be in some cases tolerated on the ground of conveniency or expediency, it can possess no recommendation as a profitable mode of management in other circumstances; and the best farmers, indeed, from Bakewell, who used to say that it was robbing Peter to pay Paul, down to the present time, agree in reprobating sheep-folding as a branch of general management.

"This morning (September 22d, 1780) measured a sheep-fold set out for 600 sheep, consisting of ewes, wedders, and grown lambs. It measures 8 by 5½ rods, which is somewhat more than 7 rods to 100, or 2 yards to a sheep."

"August 29, 1781. Last autumn made an accurate experiment, on a large scale, with different manures for wheat, on a sandy loam, summer-fallowed.

"Part of an 18 acre piece was manured with 15 or 16 loads of tolerably good farm-yard dung an acre, part with three chaldrons of lime an acre; the rest folded upon with sheep twice; the first time at the rate of 600 sheep to a quarter of an acre (as in first Minute), the second time thinner.

"In winter and spring the dung kept the lead; and now, at harvest, it has produced the greatest burden of straw.

"The sheep-fold kept a steady pace from seedtime to harvest, and is now evidently the best corned and the cleanest crop.

"The lime, in winter and spring, made a poor appearance; but after some showers in summer, it flourished much, and is now a tolerable crop, not less, I apprehend, than three quarters an acre.

"From these data, the value of a sheep-fold, *in this case*, may be calculated.

"It appears from the first Minute that 100 sheep manured seven square rods daily. But the second folding was thinner,—suppose nine rods; this is, on a par of the two foldings, eight rods a day each folding.

"The dung could not be worth less than half-a-crown a load, and the carriage and spreading ten shillings an acre; together, fifty shillings an acre; which quantity of land the hundred sheep teathed twice over in forty days.

Value of manure.

"Supposing them to be folded the year round, they would at this rate fold nine acres annually; which, at 50s. an acre, is L.22. 10s. a hundred, or 4s. 6d. a head.

"In some parts of the island the same quantity of dung would be worth L.5 an acre, which would raise the value of the teathe to nine shillings a head; which, at twopence a head a week, is more than the whole year's keep of the sheep.

"It does not follow, however, that all lands would have received equal benefit with the piece in consideration, which perhaps had not been folded upon for many years, perhaps never before; and sheep-fold, like other manures, may become less efficacious the longer it is used on a given piece of land." (Marshall's *Rural Economy of Norfolk*, vol. ii. p. 29.)

It must readily occur, that to fold on land in tillage all the year is nearly impracticable; and that where it could be done, the manure would be greatly diminished in value from rain and snow, to say nothing of the injury to the sheep themselves; so that the estimate of four shillings and sixpence, or nine shillings a head, is evidently in the extreme.

Objections to folding.

According to the experience of Mr Arthur Young (*Farmer's Kalendar*), the same land will maintain one-fourth more stock when the animals are allowed to depasture at liberty, than when confined during the night in folds. The injury to the stock themselves, though it is not easy to mention its precise amount with any degree of accuracy, cannot well be doubted, at least in the case of the larger and less active breeds, when it is considered that they are driven twice a day, sometimes for a distance of two or even three miles, and that their hours of feeding and rest are in a great measure controlled by the shepherd and his boy. "When they are kept in numerous parcels, it is not only driving to and from the fold that affects them, but they are in fact driving about in a sort of march all day long, when the strongest have too great an advantage, and the flock divides into the head and tail of it, by which means one part of them must trample the food to be eaten by another. All this proves the very reverse of their remaining perfectly quiet in small parcels." Another writer observes, that "were the pasture sheep of Lincolnshire to be got into a fold once a week, and only caught one by one and put out again immediately, it would prevent their becoming fat." (Parkinson *on Live Stock*, vol. i. p. 367.) The only sort of folding ever adopted to any extent by the best breeders is on turnips, clovers, tares, and other rich food, where the sheep feed at their ease, and manure the land at the same time.

Sheep-yards.

Another mode of management somewhat akin to this practice, and which is similar to one that has been warmly recommended in a recent publication (Sir J. Sinclair's *Husbandry of Scotland*), as if it had been formerly unknown, is described and commented on by Mr Young as follows:—"This practice is, to confine them at night in a sheep-yard, well and regularly littered with straw, stubble, and fern; by which means you keep your flock warm and healthy in bad seasons, and at the same time raise a surprising quantity of dung,—so great a quantity, if you have plenty of litter, that the profit will be better than folding on the land. A great improvement in this method would be, giving the sheep all their food (except their pasture) in such yard, viz. hay and turnips, for which purpose they may be brought up not only at night, but also at noon, to be baited; but if their pasture be at a distance, they should then, instead of baiting at noon, come to the yard earlier in the evening, and go out later in the morning. This is a practice that cannot be too much recommended; for so warm a lodging is a great matter to young lambs, and will tend much to forward their growth: the sheep will also be kept in good health; and, what is a point of consequence to all farms, the quantity of dung raised will be very great. If this method is pursued through the months of December, January, February, March, and April, with plenty of litter, 100 sheep will make a dunghill of at least 60 loads of excellent stuff, which will amply manure two acres of land; whereas 100 sheep folded (supposing the grass dry enough) will not in that time equally manure an acre."

That such a method may be advantageous in particular cases, it would be rash to deny; but, generally, it is not advisable, either on account of the sheep, or any alleged advantage from the manure they make. As to the sheep, this driving and confinement, especially in summer, would be just as hurtful as folding them in the common way; and it has been found that their wool was much injured by the broken litter mixing with the fleece, in a manner not to be easily separated; besides, now that it is the great object of every skilful breeder to accelerate the maturity of his sheep, as well as other live stock,—among other means, by leaving them to feed at their ease, and, if circumstances permit, in small parcels,—such a practice as this can never be admissible in their management. And with regard to manure, there can be no difficulty in converting into it any quantity of straw, stubble, and fern, by cattle fed in fold-yards, on green herbage in summer, and turnips or other succulent food in winter; while the soil, especially if it be of a light, porous quality, is greatly benefited, both by the dung and treading of sheep allowed to consume the remainder of both sorts of food on the ground. It is true that the dung of sheep has been generally supposed to be more valuable than that of cattle; but accurate experiments have not been made to determine the difference in this respect among these and other polygastric animals. The greater improvement of pastures by sheep is probably owing as much to their mode of feeding as to the richer quality of their dung.

Dr Parry's experiments.

On the subject of breeding and rearing sheep, it would be improper to omit noticing the judicious and successful experiments of Dr Parry and others, in crossing our native breeds with the Merino race, having for their object to improve the carcass without deteriorating the quality of the wool.

The land on which Dr Parry began his experiments was high, of a thin staple, dry, unsheltered, and consequently unproductive; and as his other avocations did not permit him constantly to superintend its management, he became impressed with the belief that its most profitable application would be to a breed of sheep, the return of which should chiefly depend on the fleece; and such a breed he proposed to obtain by means of crossing with the Merinos, some of which had then (1792) been recently imported by the king. Accordingly he fixed, as the basis of his experiments, on the Ryeland breed, which has long been reputed as affording some of the finest wool in the island.

Lavatories.

Dr Parry objects to washing the wool on the sheep's back before shearing. The fleece is so thick, that when thoroughly soaked with water it is very long in drying; and if the weather prove wet and cold, the sheep are evidently much incommoded. He therefore recommends public lavatories, as in Spain, for cleansing the wool after being shorn. His sheep are shorn about the second week of June; and if the weather be then unfavourable, he thinks it would be fit to house them for two or three nights or days after the operation. The lambs have been always shorn unwashed at the end of July or beginning of August, without appearing to have suffered any injury. The fleece of such lambs as are rather coarse, he thinks, should be always shorn, as he has shown that the wool of many of this race is comparatively coarse, even in those individuals in which the fleeces afterwards acquire the finest

Housing.

Shearing lambs.

quality. The finer-fleeced lambs may be left unshorn, as it has been proved that no loss is sustained by delaying shearing them till the usual period.

Effects of crossing.

The effects of successive crosses, both on the form and the fleece of the progeny, are ably illustrated by this accurate experimentalist. With regard to the former, Dr Parry candidly declares that his only object, the improvement of the fleece, did not allow him to give attention to the best forms in selecting his breeders; but, notwithstanding this, "my sheep," he observes, "are in general shorter in the legs and necks, have smaller bones, a rounder barrel, a wider loin, and consequently a better hind quarter, than any pure Merinos I have happened to see, except one particular ram belonging to Lord Somerville." This change he attributes to the female or Ryeland blood, which, in forming the progeny, acts most on the carcass, while that of the male or Merino chiefly affects the skin and fleece.

According to the general opinion of cultivators on the Continent, any breed of ewes, however coarse and long in the fleece, will, on the fourth cross of the Merino ram, give progeny with short wool equal to the Spanish. Of the truth of this proposition, however, Dr Parry justly expresses some doubts, derived from his own experience and that of others. But it is certain, he adds, that one cross more will, in most cases, effect the desired purpose.

Successive crosses.

"If we suppose the result of the admixture of the blood of the Merino ram to be always in an exact arithmetical proportion, and state the native blood in the ewe as 64, then the first cross would give $\frac{32}{64}$ of the Merino; the second, $\frac{48}{64}$; the third, $\frac{56}{64}$; the fourth, $\frac{60}{64}$; the fifth, $\frac{62}{64}$; the sixth, $\frac{63}{64}$; and so on. In other words, the first cross would leave 32 parts in 64, or half of the English quality; the second 16 parts, or one fourth; the third 8 parts, or one eighth; the fourth 4 parts, or one sixteenth; the fifth 2 parts, or one thirty-second; the sixth 1 part, or one sixty-fourth; and so on.

"Now, if the filament of the Wiltshire or any other coarse wool be in diameter double that of the Ryeland, it is obvious that, according to the above statement, it would require exactly one cross more to bring the hybrid wool of the former to the same fineness as that of the latter. This, I believe, very exactly corresponds with the fact. The difference between one eighth and one sixteenth is very considerable, and must certainly be easily perceived, both by a good microscope, and in the cloth which is manufactured from such wool. In the latter method it certainly has been perceived; but I have hitherto had no opportunity of trying the difference by the former. The fifth cross, as I have before observed, brings the Merino-Wilts wool to the same standard as the fourth of the Merino-Ryeland." (*Communications to the Board of Agriculture*, vol. v. p. 438.)

Several other distinguished individuals have taken a lead in improving the fleeces of our native short-woolled breeds, by crossing them with the Merinos, and, while their patriotic exertions deserve well of their country, have considerably increased their own profits. At the head of these, perhaps, we ought to place Lord Somerville, who undertook a voyage to Portugal for the sole purpose of selecting from the best Spanish flocks such sheep as united in the greatest degree the merit of a good carcass to a superior fleece. Notwithstanding the difficulties he had to encounter, augmented by the war between Great Britain and Spain, he brought home, in 1801, a flock of the first quality, selected from the *Trashumante* or travelling breeds of Merinos, which was the admiration of the Spanish shepherds through whose flocks they passed in their journey to England. Small flocks of Merinos are now established in Ireland and Scotland; and the late Mr Malcolm Laing was very successful with a numerous one, so far north as the Orkney Isles.

Merinos and South Downs.

We shall conclude our account of this valuable race and its cross-breeds with an extract from a letter sent by Mr Birkbeck, a professional farmer of the highest class, to Dr Parry, and quoted by the doctor in the essay above referred to. "The fleeces of the first cross (between Merinos and South-Downs), washed, are to the parent South Downs as six to five in weight, and as three to two in value per pound. Thus,

100 South Down fleeces, 2½ lb. each at 2s. L.25.
100 First cross .... 3 lb. .... 3s. L.45.

"So much for wool; and were it not for the air of extravagance it might give my statement, I should add, that there is an evident improvement, as to usefulness of form and disposition to fatten, in a large proportion of individuals. I had the courage to exhibit at Lord Somerville's show, in March last, five ewe-hogs from your rams, and the honour to bear away the prize from all competitors, by the merit of carcass and fleece jointly. On the whole, I believe that the improvement of the wool may go on, without detriment to the carcass, until we shall attain a breed of sheep with Spanish fleeces and English constitutions; but I am also convinced that this must be the result of careful and judicious selection."

3. *Fatting.*

Age of fatting.

After what has been said in the chapter on arable land (see TURNIPS, page 286), and in the second chapter (see PASTURES, page 310), little remains to be added on this point. The age at which sheep are fatted depends upon the breed, some breeds, such as the Leicester, maturing at an earlier age than others under the same circumstances; and also on the abundance and quality of the food on which they are reared, a disposition to early obesity, as well as a gradual tendency towards that form which indicates a propensity to fatten, being materially promoted by rich food, while the young animals are yet in a growing state. On good land, the Leicester wethers are very generally brought to a profitable state of fatness before they are eighteen months old, and are seldom kept on for fatting beyond the age of two years. The Highland breeds, on the other hand, though prepared, by means of turnips, a year at least sooner than they could be in former times, usually go to the shambles when from three to four years old. The ewes of the first description are commonly fatted after having brought lambs for three seasons, that is, after they have completed their fourth year; and those of the small breeds at from five to seven years of age, according to circumstances.

Food.

Besides the numerous flocks fatted on pastures for the supply of the market during summer, a very large proportion, especially of the sheep kept on arable land, is fatted chiefly on turnips, the winter and spring consumption of butcher-meat being now abundantly provided for by means of this root, in all those districts where the best courses of husbandry prevail. We have already mentioned the weight of the different breeds in the description of them —the mode of feeding, under the heads of *Pastures* and *Turnips*—and shall now only add, that it is an invariable rule with all good managers, never to allow this, or any other animal reared solely for the shambles, ever to lose flesh, from its earliest age till it is sent to the butcher;— that it is found of much advantage, with a view to speedy fattening, as well as to the economy of food, to separate a flock into divisions corresponding with its different ages, and the purpose of the owner as to the time of carrying them to market;—and that the change from the food of

General rules.

store to fattening stock—from that which is barely capable of supporting the condition which they have already attained, to that which is adapted to their speedy improvement in fatting—ought to be gradual and progressive. Thus, very lean sheep are never, in good management, put to full turnips in winter, nor to rich pastures in summer; they are prepared for turnips on good grass-land—often on the aftergrass of mown grounds; and kept on second year's leys, and afterwards a moderate allowance of turnips, if they are to be fatted on pastures. It is a common practice, in the instance of the Leicesters, to keep all that are not meant for breeding always in a state of fatness; and, after full feeding on turnips through winter and spring, to finish them on the first year's clovers early in summer, when the prices of meat are usually the highest.

House-lambs.

The luxury of the age has called forth the ingenuity of man to accelerate the course of nature, at an expense which, in this species in particular, is in no degree compensated by the intrinsic value of the young animal as human food. *House-lambs* are fed in such numbers as the demand may require, in the vicinity of London and other large towns, where they are sold in the early part of the season, commonly at much higher prices than fat sheep of full growth. The Dorsetshire breed, as we formerly observed, can be made to yean at almost any season of the year, and they are therefore the only kind kept near London. But in the neighbourhood of those towns where the rich are willing to dispense with lamb during the early part of winter, other breeds are made to furnish the supply at a more advanced period of the season.

The following account of the London practice may be useful to those farmers who find it their interest to give their attention to this branch of management:—

"The sucklers, salesmen, and butchers of London are aware that such lambs as have *sharp barbs* on the inside of their lips are certainly of a *deep colour* after being butchered; and all those whose *barbs* are naturally *blunt* do as certainly *produce fair meat.*

"This knowledge has been the occasion of *many lambs of the latter kind being kept for rams, and sent into Dorsetshire, expressly for the purpose of improving the colour of the flesh of house-lambs.*

"*The issue of such rams can generally be warranted fair, and such meat always sells at a higher price*; hence arose the mistaken notion, that Middlesex rams were necessary to procure house-lambs.

"The sheep, which begin to lamb about Michaelmas, are kept in the close during the day, and in the house during the night, until they have produced twenty or thirty lambs. These lambs are then put into a lamb-house, which is kept constantly well littered with clean wheat-straw; and chalk, both in lump and in powder, is provided for them to lick, in order to prevent looseness, and thereby preserve the lambs in health. As a prevention against gnawing the boards, or eating each other's wool, a little wheat-straw is placed, with the ears downwards, in a rack within their reach, with which they amuse themselves, and of which they eat a small quantity. In this house they are kept with great care and attention until fit for the butcher.

"The mothers of the lambs are turned, every night at eight o'clock, into the lamb-house to their offspring. At six o'clock in the morning these mothers are separated from their lambs and turned into the pastures; and, at eight o'clock, such ewes as have lost their own lambs, and those ewes whose lambs are sold, are brought in and held by the head till the lambs by turns suck them clean: they are then turned into the pasture; and at twelve o'clock, the mothers of the lambs are driven from the pasture into the lamb-house for an hour, in the course of which time each lamb is suckled by its mother. At four o'clock all the ewes that have not lambs of their own are again brought to the lamb-house, and held for the lambs to suck; and at eight the mothers of the lambs are brought to them for the night.

"This method of suckling is continued all the year. The breeders select such of the lambs as become fat enough, and of proper age (about eight weeks old), for slaughter, and send them to market during December and three or four succeeding months, at prices which vary from one guinea to four, and the rest of the year at about two guineas each. This is severe work for the ewes, and some of them die under excess of exhaustion. However, care is taken that they have plenty of food; for when green food (viz. turnips, cole, rye, tares, clover, &c.) begins to fail, brewers' grains are given them in troughs, and second-crop hay in racks, as well to support the ewes as to supply the lambs with plenty of *milk*; for if *that* should not be abundant, the lambs would become stunted, in which case no food could fatten them.

"A lamb-house, to suckle from one hundred and sixty to one hundred and eighty lambs at a time, should be seventy feet long and eighteen feet broad, with three coops of different sizes at each end, so constructed as to divide the lambs according to their ages." (*Middlesex Report*, p. 355.)

SECT. IV. SWINE.

Swine a subordinate species of stock.

Though there are many instances of this species of live stock being kept in such numbers as to be a source of very considerable emolument to their owners, yet, generally speaking, swine are viewed by farmers merely as a subordinate concern; and perhaps, in most cases, their chief value is held to consist in their being maintained on what would otherwise be entirely lost. With millers, brewers, distillers, and dairymen, they are an object of more importance, and return, for the offals they consume, a greater weight of meat (according to some, double the weight) than could be obtained from cattle. In those parts where potatoes are raised as a fallow crop, much beyond the demand for them as human food, as is the case in particular in Ireland and the west of Scotland, the rearing and feeding of swine, most of which are sent to a distance in the state of bacon and pickled pork, is a branch of management on which great dependence is placed for the payment of their rents and other charges.

It has been made a question, whether swine will pay for being wholly fed on crops raised for this purpose; and various calculations have been offered, to show how much they will return for a given quantity of corn and roots; but the results are so discordant, that much more accurate experiments must be made before any thing certain can be stated on this point. Perhaps the principal consideration which affects the question is, the extremely prolific nature of the animal, which renders it easy, in a very short time, to supply them in too great numbers for the demand. It is this circumstance, probably, that has, more than any other, prevented the farmers of arable land from employing any large portion of their crops in feeding swine, the flesh of which varies in price more than that of other butcher-meat, and often at very short intervals. Yet if their food be herbage and roots, with a small allowance of corn or pulse in the last stage of fatting, and if the breeds are judiciously chosen and well managed, there seems no reason to doubt that, in many situations, swine will yield as much, perhaps, on an average of years, a greater profit, for the food they consume, than any other species of live stock.

It is only in particular districts that so much attention has been paid to this animal as to give rise to any accurate distinction of breeds; and nowhere has it received any considerable portion of that care in breeding which has been so advantageously employed on the other animals of which we have treated. Yet among none of the varieties of those is there so great a difference as among the breeds of this species, in regard to the meat they return for the consumption of a given quantity of food. Some races can with difficulty be made fat, even at an advanced age, though fed from the trough with abundance of such food as would fatten any other animal; while others contrive to raise a valuable carcass out of materials on which no other creature could subsist.

Breeds. Mr Culley mentions only three breeds, viz. the Berkshire, the Chinese, and the Highland or Irish; but other writers have found a distinct breed in most of the counties of England, which they have thought proper to describe separately. The Chinese race has been subdivided into seven varieties or more; and it would be easy to point out twice the number of as prominent distinctions among the sorts in the third class. But such an affectation of accuracy is as useless as it would be tedious. One general form, approaching to that of other animals kept for their carcass, ought certainly to be preferred; and the size, which is the other distinguishing characteristic, must be chosen with a view to the food provided for their maintenance, and not because it is possible to raise the individuals to a great and probably unprofitable weight. The fineness of bone, and the broad though also deep form of the chest, denote in this, as in the other species, a disposition to make fat with a moderate consumption of food; and, while it may be advisable to prefer the larger breeds in those places where bacon and flitches are in most demand, the smaller breeds are most esteemed for pickling, and are, beyond all doubt, most profitable to those farmers who allow them little else than the range of the farm-yard and the offals of the kitchen.

The *Berkshire* pigs, now spread through almost every part of England and several places of Scotland, are in general of a reddish colour, with black spots, large ears hanging over their eyes, short-legged, small-boned, and inclined to make fat. The surprising weight that some of these hogs have been fed to would be altogether incredible, were not the facts well attested. "On Monday the 24th of January 1774, a pig (fed by Mr Joseph Lawton of Cheshire) was killed, which measured, from the nose to the end of the tail, three yards eight inches, and in height four feet five inches and a half. When alive, it weighed 12 cwt. 2 qrs. 10 lb.; when killed and dressed, it weighed 10 cwt. 3 qrs. 11 lb. or 86 stones 11 lb. avoirdupois." (Culley *on Live Stock*, p. 173.)

The *Hampshire* breed of hogs is also very large, being longer in the body and neck, but not of so compact a form, as the Berkshire: they are mostly white, and well disposed to fatten.

The *Sussex* pig is distinguished by being black and white, but not spotted, frequently black at both ends, and white in the middle. Their general size, when full-grown, is about 18 or 20 stone.

The *Suffolk* white pig stands high, is narrow on the back, with a broad forehead; the hair is short, with many bristles; weight 16 to 19 stone.

The *Cheshire* breed is distinguished by their gigantic size: in colour they are black and white, blue and white (not spotted, but in large patches of black or blue), and some all white. Their heads are large, with very long ears, remarkably long in the body, very narrow in proportion to their size, with large bones, long legs, and much loose skin.

The *Shropshire* pig is also a large, coarse animal, with much bone and hair, and many bristles; their colour mostly white, with black patches, some rather sandy. They are said to be much liked by the distillers.

The largest breed of the island is supposed to be kept about Rudgewick, on the borders of Sussex and Surrey. They feed to an extraordinary size, and weigh, at two years old, nearly double or triple the weight of most other sorts at that age. (*Middlesex Report.*)

The Chinese breed is of different colours, white, black, black and white in irregular patches, and of a sandy hue; and their size is no less varied, though all of them smaller than the breeds already mentioned. The larger sort, such as weigh 10 or 12 stones when about a year old, or rather perhaps a cross with some native breed, may be recommended as the most suitable kind for arable farms, when their maintenance is to be got chiefly in the fold-yards. The form of the Chinese pig is generally good, and their flesh excellent; but it is easily made too fat for delicate stomachs.

The most numerous in the lowland counties of Scotland were, and in many places still are, very unprofitable animals. They are of a white colour; have light, narrow carcasses, with bristles standing up from nose to tail; long legs; and are very slow feeders, even at an advanced age. In the Highlands and Hebrides the breed, supposed by Dr Walker to be the aboriginal, is of "the smallest size, neither white nor yellow, but of a uniform grey colour, and shaggy, with long hair and bristles. They graze on the hills like sheep; their sole food is herbage and roots, and on these they live the whole year round, without shelter, and without receiving any other sustenance. In autumn, when they are in the best order, their meat is excellent, and without any artificial feeding; but when driven to the low country, they fatten readily, and rise to a considerable bulk." (Walker's *Hebrides*, vol. ii. p. 17.) In the Orkney Islands they are commonly of a dark red, or nearly black colour, and have long bristles, with a sort of coarse wool beneath them.

Management. The mode of *breeding*, the *food*, and the general *management* of swine, are all of them so much dependent on local circumstances, and are so much varied in consequence, that it is neither possible, nor would it be of any utility, to describe the practice of different counties, or rather of almost every different individual.

The period of gestation with swine is 16 weeks. The pigs are commonly weaned when six weeks old; soon after which the sow is again in season, so that two litters are usually farrowed within the year; sometimes, though very rarely, five litters in two years. There are two things of particular importance to be attended to in the breeding of swine. They should not be allowed to farrow in winter, as young pigs are exceedingly tender, and can with difficulty be preserved in very cold weather; nor at a time when food is scarce, as is generally the case upon corn-farms in summer, if the stock of them is large. The months of February and August have been recommended as the best periods for parturition. (Henderson *on Swine*, p. 27.) Twenty swine are estimated to bring at an average seven pigs and a half each for their first litter (*Ibid.* p. 17); but the number varies much, and many young pigs are lost soon after their birth by the unkindness of their dam, and by casualties, to which they are more exposed than most other young animals.

A sow in pigs should be separated from the herd some time before she is expected to farrow, carefully watched, and littered with a small quantity of dry short straw. Too much straw is improper, both at the time of farrowing and for a week or two afterwards, as the pigs are apt to nestle beneath it unperceived by the sow, and are thus in danger of being smothered when she lies down. A breeding sow should be well fed, particularly when nursing; and it is advantageous early to accustom the pigs to feed from a low trough, on milk or other liquid food mixed with meal or bran. Such of the pigs of both sexes as are not to be kept for breeding are usually castrated or spayed when about a month old, and the whole may be weaned at the end of six or seven weeks. They should then be fed regularly three times a day, with meal and water a little warmed, until they are able to shift for themselves among the rest of the stock.

The food allowed, whether to growing or fattening swine, depends on the circumstances of their owners. The cottager's pig must be contented with the scanty offals of his kitchen and of his dairy, the produce generally of a single cow. Towards the end of autumn a few potatoes are added, for the purpose of preparing it for slaughter, and perhaps a little meal is mixed with boiled potatoes for a week or two before. Such pigs, however, often thrive amazingly, make themselves moderately fat, and form a most valuable addition to the winter stores of their owners. In the south-eastern counties of Scotland, the hinds or married ploughmen are commonly allowed to keep a pig each, which they feed in this manner, and from which their families derive much benefit at very little expense. On many corn-farms, the chief, and not unfrequently the only dependence of swine, is on the straw-yards. The sweepings of the barn-floor, corn left upon the straw, and oats found among the dung of horses, with a share of the turnips given to the cattle in winter, and of the clover in summer, afford ample subsistence to swine, in the proportion, perhaps, of one to every five or six acres under corn, clover, and turnips. The kitchen and dairy give some assistance to pigs newly weaned, and also to such as are soon to be slaughtered. A great many are killed when about a year old that have never been fed at any expense that can be estimated. A few pigs, if of a good breed, will always be moderately fat at that age with the run of the straw-yards, and their flesh is of an excellent quality.

Feeding for bacon.

When farmers find it profitable to keep large swine that cannot be fattened for bacon, as is the practice in some of the western counties, without a regular supply of food being served up to them, the method is, to rear them chiefly on raw potatoes and Swedish turnips, and to fatten them on these roots boiled or prepared by steam, with a mixture of oat, barley, or bean and peas meal. Their troughs should be often replenished with a small quantity of food at a time, and kept always clean; and their food changed occasionally, and seasoned with salt. "If proper care be taken," says a late writer, "a feeding pig should not consume more than six Winchester bushels of oats made into meal. It ought to be shelled before it is ground, the same as for family use, but need not be sifted." (Henderson's *Treatise on Swine*, p. 26.)

Mode of preventing their digging.

Swine, it is well known, are very apt to get into forbidden ground: upon tillage farms they are seldom, for this reason, permitted to go at large, unless sometimes for a few weeks on the stubbles, or where the number is so large as to afford the expense of constant herding. In many cases they are almost always confined to the cattle-yard, or a fold-yard beside their styes. Another bad property in this animal is, the habit of digging into the soil; for which the most effectual preventive is, to cut the two strong tendons of their snout, by a slight incision with a sharp knife, about an inch and a half from the nose. This may be done with little pain, and no prejudice to the animal, when about two or three months old. The common practice of restraining them by rings fixed in the snout is painful and troublesome: they must be replaced as often as they give way; and that happens so frequently, that rings afford but little security against this nuisance.

Styes.

Styes or swine-houses are set down in different situations, according to the numbers kept, and the manner of feeding them. The cottager erects a little hut contiguous to his dwelling, and many small farmers also choose to lodge them near the kitchen. If swine are kept chiefly in the straw-yard, their houses are so situated as to give ready access by a door which opens into it. See Plate XI. The gentleman-farmer erects a range of low buildings on that side of his farm-offices which is least exposed to view, and incloses and subdivides a small yard for their use. Where this branch of husbandry is carried on in all its parts, there must be separate houses for sows heavy with young, for such as are nursing, for pigs newly weaned, and for rearing and for fattening stock. (*General Report of Scotland*, vol. iii. p. 217.)

In the pickling and kitting of pork, a branch of business which is carried on to a considerable extent at many of our seaports, the carcass is cut in pieces, and packed in kits made for the purpose, containing from one to two cwt. Salt is dissolved in water till the mixture be strong enough to swim an egg; it is then boiled, and, when cold, poured upon the pork. When the end of the kit is fixed in, the article is ready for being sent to market.

A late writer has given particular directions for the curing of bacon, founded upon a long course of experience, which therefore deserve to be more generally known. We shall give them in his own words.

Directions for curing bacon.

"After the carcass has hung all night, lay it upon a strong table or bench, upon its back, cut off the head close by the ears, and cut the hinder feet so far below the hough as will not disfigure the hams, and have plenty of room to hang them by. Then take a cleaving knife, and, if necessary, a hand-mallet, and divide the carcass up the middle of the back-bone, laying it in two equal halves. Then cut the ham from the side by the second joint of the back-bone, which will appear on dividing the carcass; then dress the ham, by paring a little off the flank or skinny part, so as to shape it with a half-round point, clearing off any top fat that may appear. The curer will next take off the sharp edge along the back-bone with his knife and mallet, and slice off the first rib next the shoulder, where he will perceive a bloody vein, which he must take out, for if it is left in, that part is apt to spoil. The corners must be squared off where the ham was cut out.

"In killing a number of swine, what sides you may have dressed the first day lay upon some flags or boards, piling them across each other, and giving each flitch a powdering of saltpetre, and then covering it with salt. Proceed in the same manner with the hams by themselves, and do not omit giving them a little saltpetre, as it opens the pores of the flesh to receive the salt, and besides gives the ham a pleasant flavour, and makes it more juicy.

"Let them lie in this state about a week, then turn those on the top undermost, giving them a fresh salting. After lying two or three weeks longer, they may be hung up to dry in some chimney or smoke-house. Or, if the curer chooses, he may turn them over again, without giving them any more salt; in which state they may lie for a month or two without catching any harm, until he has convenience for drying them. I practised for many years the custom of carting my flitches and hams through the country to farm-houses, and used to hang them in their chimneys and other parts of the house to dry, some seasons to the amount of five hundred carcasses. This plan I soon found was attended with a number of inconveniences, yet it is still common in Dumfries-shire.

Smoke-house.

"About twenty years ago I contrived a small smoke-house, of a very simple construction. It is about twelve feet square, and the walls about seven feet high. One of these huts requires six joists across, one close to each wall, the other four laid asunder at proper distances. To receive five rows of flitches, they must be laid on the top of the wall. A piece of wood, strong enough to bear the weight of one flitch of bacon, must be fixed across the belly end of the flitch by two strings, as the neck end must hang downwards. The piece of wood must be longer than the flitch is wide, so that each end may rest upon a beam. They may be put so near to each other as not to touch. The width of it will hold 24 flitches in a row, and there will be five rows, which will contain 120 flitches. As many hams may be hung at the same time above the flitches, contrived in the best manner one can. The lower end of the flitches will be within 2½ or 3 feet of the floor, which must be covered five or six inches thick with sawdust, which must be kindled at two different sides. It will burn, but not cause any flame to injure the bacon. The door must be kept close, and the hut must have a small hole in the roof, so that part of the smoke may ascend. That lot of bacon and hams will be ready to pack up in a hogshead to send off in eight or ten days, or a little longer, if required, with very little loss of weight. After the bacon is salted, it may lie in the salt-house as described, until an order is received, then immediately hang it up to dry.

"I found the smoke-house to be a great saving, not only in the expense and trouble of employing men to cart and hang it through the country, but it did not lose nearly so much weight by this process.

"It may be remarked, that whatever is shipped for the London market, or any other, both bacon and hams, must be knocked hard, and packed into a sugar hogshead, or something similar, to hold about ten hundredweights. Bacon can only be cured from the middle of September until the middle of April." (Henderson's *Treatise on Swine*, p. 39.)

Brawn.

The treatment of boars for brawn, and the after-preparation of the article, is carried on in Kent and some other parts of England; but it is the object of those concerned in this business to keep the process secret. According to answers returned to queries transmitted by the Board of Agriculture in 1804, the boars are put up for feeding at all ages, and in an entire state; but they are preferred when only two years old. They were usually kept apart, each of them in a case so small as not to be able to turn round, but sometimes eight together in larger pens. Their food is beans, with sulphur given in their water. A large animal is preferred, producing a collar of about 30 lb. weight, which then brought 2s. per lb.; the lean parts being made into sausage meat, and sold at 6d. per lb. (*Farmer's Magazine*, vol. vi. p. 431.)

SECT. V. MISCELLANEOUS LIVE STOCK.

Under this title we would comprise Asses, Mules, Goats, Rabbits, Pigeons, Poultry, and Bees.

The value of these animals, as agricultural live stock, is comparatively inconsiderable in Britain, notwithstanding their importance in some other countries; and, in an economical view, some of them are undoubtedly wasteful and pernicious. *Asses* and *mules* are seldom or never employed in field labour, though it was the opinion of Mr Bakewell, and a few other eminent agriculturists, that there would be some advantage in propagating the ass on account of its hardiness, and the coarse food on which it may be maintained. Trials have been made to improve our present breeds, by crosses with males introduced from foreign parts, without having had the effect, however, of bringing them into use, either for the plough or the cart, and wherever the services of a small animal are required, we have horses of all sizes, from nine to eighteen hands high, which seem better adapted to every purpose than asses or mules. *Goats* are to be found only in small numbers, except in some parts of the Highlands, and are kept chiefly for the medicinal quality of their milk. *Pigeons* are justly considered as a nuisance by every respectable writer on rural economy, and certainly by every farmer who is within the reach of their depredations.

Asses and mules. Goats. Pigeons.

Rabbits.

Rabbits are a kind of stock about which some difference of opinion still exists among intelligent men, though there are perhaps very few situations in which they can be considered as more profitable than any other mode of occupancy. It is not merely that they in general return less for their food than other stock, but that they are also very difficult to confine, and most destructive to the crops and fences in their vicinity. Their number, though still considerable, has accordingly decreased, and continues to decrease, with the progress of improvement; and unless their skins shall become of much greater value than at present, they can be an object of consideration only on such tracts as must otherwise be left to the animals that are still in a state of nature. In the present state of our agriculture, however, if it be found advantageous to retain this species, it is proper that the best breeds and the best mode of management, as well as their value, should be known.

A deep, sandy, poor soil is the most suitable for rabbits, though, under good management, as turnips must be provided for winter, there should be parts of it capable of bearing that and other crops; and the situation may be either on the sides of hills or on a flat surface. Artificial burrows are made with an auger, to reconcile them to the ground, and to preserve them from vermin, until they have time to make their own burrows; and on level warrens, this implement may be usefully employed from time to time afterwards. Warrens are commonly fenced with a sod wall, capped with furze or black thorn, in all about six feet high, and should always be kept in complete repair. Besides the rabbits, a number of sheep are usually kept in these grounds during the summer.

The *silver-haired* rabbit is now more esteemed than the *grey*, though the latter is so much hardier, that if a warren be stocked with both, there will in a few years be nothing but greys. (*Lincolnshire Report*, p. 382.) The skin of the grey rabbit is *cut*, that is, the "wool" is pared off the pelt, as a material of hats; whereas that of the silver-haired, which sells much higher, is dressed as fur, and goes, it is said, principally to the East Indies. (Marshall's *Yorkshire*, vol. ii. p. 265.)

One buck will serve one hundred does; the doe takes the buck the day she brings forth, and goes thirty-one days with young, which she suckles for about twenty-two days, for the first half of which they are blind. But when confined in warrens, rabbits seldom breed more than twice a year, and some of them only once: in particularly wet, cold seasons, few or none bring more than one litter. (Parkinson *on Live Stock*, vol. ii. p. 299.) The skins are in their best state from the middle of November till Christmas, during which period all that are not to be kept for breeding are slaughtered. Silver skins have been sold of late at from 15s. to 21s. a dozen.

"The best manner of taking rabbits is by folds, by means of nets and cords. The day before the rabbits are intended to be taken, the warrener, with his assistants, incloses many acres of ground, the bank generally making one end, and sometimes part of a side: the fore part of the fold is left entirely open. Rabbits form their colonies in some part all together, at a distance from their feeding ground, and nearly all leave their home or burrows at the time of feeding, when the warrener fixes his nets, by two men beginning at each end, who meet in the middle. Thus, in fine dry weather they can nearly take all that is wanted at once; but it is a general practice to fold at two separate times from each colony. Within the fold are formed what are termed angles, in that part nearest to the burrows; as the rabbits, when they return, and find themselves checked in getting home, will beat about by the nets. These angles are therefore so contrived as to afford them an opportunity of secreting themselves, and are made thus:—an irregular groove or channel is cut, about twelve or fourteen inches deep, and about twelve inches wide, the sods being set up one against another over the groove, so as to form a ridge like the roof of a house. These channels are made of equal lengths, both ends being left open, so that when the rabbits meet they are head to head. When the rabbits find themselves prevented from returning to their former homes, and the day-light appears, hearing the warrener and his dogs enter the fold, they quickly run into the angles, when the warrener puts a sod against the open ends, to prevent their return. The few straggling rabbits remaining in the fold are hunted by boys with dogs; but the warreners have recourse to that method as little as possible, the dogs being apt to tear the skin, and injure the carcass." (Parkinson *on Live Stock*, vol. ii. p. 299.)

Winter food.

"Turnips, clover, and sainfoin are the most proper kinds of winter food for rabbits, as also threshed oats or barley, when corn is tolerably cheap, may be given them with great propriety. The two latter need only be allowed when the ground is covered with snow, and when it does not blow about so as to cover the corn when laid down; but in severe storms, turnips are the most proper food, as they can find them by their scent, and will scratch the snow off when covered. Three large cart-loads of turnips a day will fodder one thousand or one thousand one hundred couples of rabbits, which are about a proper quantity to be left as breeding stock on 500 acres of inclosed warren land. In heavy snows, a great deal of money must be expended in clearing the snow from the warren walls, in order to keep as much as possible the rabbits within their bounds." (*Lincolnshire Report*, p. 389.)

Expense and produce.

Among several calculations to show the expense and produce, Mr Arthur Young seems to consider the following as the most accurate; and as he is a decided enemy to this stock, there is no reason to suspect exaggeration.

"Mr Holdgate states the expense of 1700 acres under rabbits, the silver sort, thus:—

Labour, three regular warreners, with extra-assistance at killing	L.85	0	0
Fences	42	10	0
Winter food	42	10	0
Nets, traps, &c. &c.	14	3	4
Delivery	21	5	0
Rent is said to be 7s. an acre	595	0	0
	L.800	8	4
The capital employed is that sum, with the addition of stock paid for; suppose this three couples an acre, at 2s. 4d.	595	0	0
	L.1395	8	4
Interest of that sum one year, 5 per cent.	69	5	0
	L.1464	13	4

Annual Account.

Expenses as above	L.800	8	4
Interest	69	5	0
	L.869	13	4

Produce.

10,000 couples at 2s. 4d.	L.1166	13	4
Expenses	869	13	4
Profit	L.297	0	0

or L.24 per cent. (the five per cent. included) on capital employed. This is very great, reckoned on the capital, but small reckoned by rent, as it amounts to only half a rent. But suppose the gross produce L.1500, which I take to be nearer the fact, then the account would stand thus:—

Produce	L.1500	0	0
Expenses	869	0	0
Profit	L.631	0	0

or L.47 per cent. on the capital.

"Take it how you will, it explains the reason for so many of these nuisances remaining. The investment of a small capital yields an interest that nothing else will; and thus the occupier will be sure never to convert them to better uses." (*Ibid.* p. 391.)

Poultry.

Eggs.

Of *Poultry*, the most difficult to rear, and the most voracious and unprofitable, is the *turkey*. *Geese*, which live, and even fatten on grass, are considered by some persons as the most valuable, and in many parts of England the number is considerable. *Ducks* are not only comparatively harmless, but, from their feeding chiefly on pernicious insects, are probably deserving of more attention than has hitherto been paid to them. But *common fowls* are by far the most numerous, and everywhere add something not inconsiderable to the income of the inhabitants of the country, and to the stock of food for the consumption of the people at large. The trade in eggs alone, between the country and the towns, is a matter of some importance, as affording profitable employment to those who collect them, and to others who afterwards send them in large quantities to the principal towns. According to the statistical account of Scotland, the people of Hawick, a small town in the county of Roxburgh, more than twenty years ago received L.50 weekly through the year, for eggs collected in the neighbourhood, and sent to Berwick for the London market; and in 1796 it was calculated that the peasantry of Mid-Lothian drew L.8000 a year for poultry and eggs. But in the way these fowls are commonly managed by farmers, there is reason to doubt whether they pay for the food they consume, and the waste they are too often allowed to commit. The number kept by any individual is commonly so small as to obtain little of that attention that is given to other domesticated animals, and their ravages are accordingly greater, and the returns smaller, than they would otherwise be. Yet in the warm cottages of country labourers, the common farm-yard hen makes a valuable return for the food she requires, which is frequently potatoes, boiled and mashed, with a little oat-meal porridge, a portion of the daily meal of its owner. A comfortable degree of warmth is so essential, that some gentlemen have had stoves placed under their roosts.

Expense and produce of common fowls.

The results of an experiment made with six hens and a cock in 1807 and 1808 were, that they ate half a peck of barley weekly, with very little other food, and laid 764 eggs in 52 weeks, the greatest number in the months of

May and August, and the smallest in November and December. The eggs were sold in the London market at 1½d. each, and the net profit, besides 11 chickens, was L.2. 12s. 2d. They were confined in a small yard, well sheltered and heated by the fires of the houses with which it was surrounded, and prevented from *sitting* by means of a feather thrust through the nostrils for a few days, the pain of which is supposed to have induced the hen to move about till the inclination to sit had passed away. (Parkinson *on Live Stock*, vol. ii.)

CHAP. IV.

GENERAL OBSERVATIONS ON THE AGRICULTURE OF BRITAIN.

Superiority of British agriculture.

The husbandry of a great part of Britain, both in respect to the cultivation of the soil and the breeding and management of live stock, is confessedly superior to that of any other country in Europe; and the quantity and value of its products, considering the character of the climate, as well as the industry, wealth, and respectability of its husbandmen, are without any parallel either in ancient or modern times. We find from Columella, that, under the Romans, the produce of the greater part of Italy was less than four times the seed (lib. iii. cap. 3); and this notwithstanding an unproductive fallow every second year, and apparently a much greater attention to minutiæ than would be compatible with the more extensive concerns of the British farmer. The average crops of Britain have been stated so high as nine times the seed, and certainly, wherever the management is tolerably correct, cannot be less than double the proportion assigned by Columella to the richer soil and more genial climate of Italy. Of the agriculture of France before the Revolution a very full and accurate account has been furnished by Mr Arthur Young, from which it is sufficiently evident how much the general produce of that country, the best cultivated perhaps next to Britain, was inferior to that of even our middling lands; and the progress it has made since has not, according to the latest and apparently exaggerated accounts, been marked by any very great improvement either in live stock or machinery, the two most distinguishing parts of British husbandry.

It is natural to ask, to what causes this superiority is owing; and why it is confined to a part of our territory, instead of being extended, as our great demand of late for foreign corn would have led us to expect, to all soils that are capable of profitable improvement. On these two points we now propose to offer a few very general remarks; and we shall submit them to the reader without affecting that precision of arrangement which more ample details would have required.

Division of landed property.

Objections to very large estates;

1. The territory of Britain is not engrossed by a few individuals, like the northern countries of Europe, nor divided into such minute portions as that of some of the small states of the Continent. The vast tracts of country held by a Russian or Polish nobleman, and the diminutive possessions of the Swiss, and more lately of the French peasantry, are almost equally inconsistent with the more productive systems of rural economy. The former are too large for the superintendence of one individual with a view to profitable cultivation; and the existence of such extensive properties implies the degradation and poverty of the great body of the people, and the absence of a middle class, possessed of disposable capital, or at least of opportunities for its investment in the soil. The latter, on the other hand, afford no room for the employment of capital, nor of those inventions by which the charges of cultivation are diminished, and its products augmented. Such small landed properties return little more than the wages of the manual labour by which they must necessarily be cultivated. Their small surplus produce, which every bad season annihilates, cannot afford subsistence to those other classes whose labours are necessary to national prosperity and individual comfort; and a part of the families of the cultivators themselves, having neither food nor employment at home, must either emigrate or perish. To a certain extent these consequences have been already experienced, both in Ireland and the Highlands of Scotland; for it would be idle to maintain that a minute division of land in tenancy does not produce all the unhappy effects which must result from the minute division of land in absolute property.

and to a minute division of landed property.

Effects of both in some respects the same.

Of two counties, in one of which estates are in general too large for the personal superintendence of the proprietors, and, in the other, the land is parcelled out into shares little more than sufficient for the subsistence of their owners, the condition of the great body of the people must be very much alike. In neither can there exist that middle class from which all valuable improvements proceed, nor any of those inventions which multiply and augment the productive powers of human industry. Both of these states of property must appear decidedly unfavourable to national prosperity, when measured by this unerring test—the quantity of the products of the soil which remains after defraying the charges of obtaining them; for upon this net surplus depend all the enjoyments of mankind beyond the mere necessaries of life, as well as the means of repelling foreign aggression, and preserving internal tranquillity.

The distribution of the landed property of Britain is equally distant from both these extremes. Though it is necessary, perhaps, to the political constitution of the country, that there should be a number of large estates, yet their extent is seldom so great as to produce any of the bad effects just mentioned, even within the bounds of a single county. Over the rural economy of the nation these large properties exert scarcely any influence at all, excepting such of them as are held by entail, which is certainly a mode of tenure greatly at variance with the full improvement of the soil. Many instances might be pointed out, of very extensive estates, fully as well cultivated, and yielding as large a surplus for the general consumption, as our agriculture, in its present state, obtains from any equal extent of similar land. It is true, that to increase the political influence of great proprietors, too many of these estates are possessed by tenants at will; but this grievance is not peculiar to such estates, the largest estates of Scotland being occupied on leases. This most serious obstacle to spirited cultivation must therefore be ascribed to political causes, and not to the engrossing of landed property.

Britain cultivated by professional men.

2. Another arrangement, which may serve to account for the superiority of British agriculture, is somewhat akin to that division of labour by which all the arts have been carried to so great a degree of perfection in this country. Few great proprietors, comparatively, cultivate their own lands beyond the demands of pleasure and convenience. The far greater part of Britain is cultivated by professional men, with their own capital, and for their own profit. The price which they must pay for their temporary rights in the soil, in the shape of rent, instead of checking their exertions, has a powerful tendency to promote every profitable improvement, to discourage dangerous speculation, and to restrain wasteful expenditure. And as it is clearly the interest of such

men, still more than of proprietors themselves, to obtain the largest produce at the least possible expense, the intermediate portion of the produce—that which is disposable for the general consumption—is consequently as large as industry and economy, in the present state of our agriculture, can make it. It is true almost to a proverb, that farming upon an extensive scale is never profitable to a great landholder; and, with a view to the interest of the nation, it ought to be discouraged, as both wasteful and unproductive. In some countries this mode of farming is a matter of necessity, as in the north of Europe, where a class of free tenants does not exist; in others the business of cultivation must be carried on as a sort of partnership, or joint concern between the proprietor and tenant, as on the *metairies* of France. Fortunately, the general distribution of wealth has long since removed the necessity for either of these methods in Britain.

Connection between landlord and tenant.

To give full effect to the professional system, it is necessary that the rights of the landlord and tenant, respectively, should be clearly defined and well secured by law and the private contract of the parties. The general principle which should regulate the terms of this connection seems to be, that while the farm ought to be restored to the owner at the expiration of the tenant's interest, at least without deterioration. the tenant should be encouraged to render it as productive as possible during his possession. In both of these views a lease for a term of years is scarcely less necessary for the interest of the landlord than of the tenant; and so much is the public interested in this measure, that it has been proposed by intelligent men to impose a penal tax on the rent of lands held by tenants at will.

Advantages of leases.

That the value of the property is enhanced by the security which such a lease confers on the tenant, will be put beyond all doubt, if the rents of two estates for half a century back are compared; the one occupied by tenants at will, and the other by tenants on leases for a moderate term, and where the soil and situation are nearly alike in every respect. If the comparison be made between two tracts originally very different in point of value, the advantages of leases will be still more striking. While that which is held by tenants at will remains nearly stationary, the other is gradually yet effectually improved, under the security of leases, by the tenant's capital; and, in no long period, the latter takes the lead of the former, both in the amount of the revenue which it yields to the proprietor, and in the quantity of produce which it furnishes for the general consumption. The higher rents and greater produce of some parts of Scotland, than of many of the English counties, where the soil, climate, and markets are much more favourable, must be ascribed to the almost universal practice of holding on leases in the former country, in a much greater degree than to any of the causes which have been frequently assigned. Less than a century ago, what are now the best cultivated districts of Scotland were very far behind the greater part of England, and indeed had made very little progress from the time of the feudal system. It is not 50 years since the farmers of Scotland were in the practice of going to learn from their southern neighbours an art which was then very imperfectly known in their own country. But in several parts of England there has been little or no improvement since, while the southern counties of Scotland have uniformly advanced, and at present exhibit, very generally, a happy contrast to their condition at the middle of last century.

In respect to farmers themselves, it cannot be necessary to point out the advantages of leases. It may be true that, under the security of the honour of an English landlord, tenants at will have been continued in possession from generation to generation, and acquired wealth which he has never, like the landholders of some other countries, attempted to wrest from them. But there are few individuals in any rank of life who continue for a length of time to sacrifice their just claims on the altar of pure generosity. Something is almost always expected in return. A portion of revenue in this case is exchanged for power, and that power is displayed not only in the habitual degradation of the tenantry, but in the control over them, which the landlord never fails to exert at the election of members of Parliament, and on all other political emergencies. No prudent man will ever invest his fortune in the improvement of another person's property, unless, from the length of his lease, he has a reasonable prospect of being reimbursed with profit; and the servility which holding at will necessarily exacts is altogether incompatible with that spirit of enterprise which belongs to an enlightened and independent mind.

The people at large are evidently most deeply affected by every measure which has a tendency to fetter the productive powers of the soil, and, at the same time, to depress one of their largest and most valuable classes. It is clearly their interest that corn and other provisions should be supplied in abundance; and the people of England may justly complain of the want of leases as one of the principal causes which check the improvement of their own territory.

Duration of leases.

What ought to be the term of a lease, can only be determined by a reference to the circumstances of each particular case. Lands naturally rich, or such as have already been brought to a high degree of fertility, requiring no great investment of capital, and returning all or nearly all the necessary outlay within the year, may be advantageously held upon short leases—such perhaps as give time for two or at most three of the rotations or courses of crops to which the quality of the soil is best adapted. The practice of England in this respect is extremely various,—almost every term, from twenty years downwards, being found in different parts of it. In Scotland, by far the most common period is nineteen years, to which it was formerly the practice, in some places, to add the life of the tenant. In that country, even when it is thought expedient to agree for a much longer term, this is still expressed in periods of nineteen years,—a sort of mysterious cycle, which seems to be no less a favourite with the courts of law than with landholders and farmers. Yet this term is somewhat inconvenient, as it can never correspond with any number of the recognised rotations of arable land.

It has been maintained by several writers, that a lease for twenty years is not sufficient to reimburse a tenant for any considerable improvements; and landholders have often been urged to agree to a much longer term, which, it is alleged, would be not less for their own interest than for that of the tenant. This is a question which our limits do not permit us to discuss; but after viewing it in different lights, assisted by the experience of long leases in different parts of Scotland, we cannot help expressing some doubts of their utility, even as regards the parties themselves; and we are decidedly of opinion, that a greater produce will be brought to market, from any given extent of land held on successive leases of twenty years, for half a century, than if held on one lease of that duration, whether the term be specified or indefinite, as in the case of a lease for life. As a general mode of tenure, leases for lives seem to us particularly objectionable.

The great advantages of a lease are so well known in Scotland, that one of her best agricultural writers, himself a landed proprietor, has suggested a method of conferring on it the character of perpetuity, to such an extent as, he thinks, would give ample security to the tenant for every profitable improvement, without preventing the landlord from resuming possession upon equitable terms, at the expiration of every specified period. But the author of this plan (Lord Kames), in his ardent wishes for the advancement of agriculture, at that time in a very backward state in his native country, seems to have overlooked the difficulties that stood in the way of its adoption; and the great advance in the price of produce, and consequently in the rate of rents, since his Lordship wrote, has long since put an end to the discussion which his proposal excited. For a form of a lease on his plan, the reader may consult Bell's *Treatise on Leases*; and the objections to the plan itself are shortly stated in the supplement to the sixth edition of Kames's *Gentleman Farmer*, published in 1815.

Long leases have been sometimes granted upon condition of receiving an advance of rent at the end of a certain number of years; but covenants of this kind, meant to apply to the circumstances of a distant period, cannot possibly be framed in such a manner as to do equal justice to both parties; and it ought not to be concealed, that, in every case of a very long lease, the chances are rather more unfavourable to the landholder than to the farmer. If the price of produce rise as it has done for the last fifty years, no improvements which a tenant can be expected to execute will compensate the landlord's loss; and if, on the other hand, prices shall decline, the capital of most tenants must be exhausted in a few years, and the lands will necessarily revert to the proprietor, as has often been the case of late. Hence a landholder, in agreeing to a long lease, can hardly ever assure himself that the obligations on the part of the tenant will be fully discharged throughout its whole term, while the obligations he incurs himself may always be easily enforced. He runs the risk of great loss from a depreciation of money, but can look forward to very little benefit from a depreciation of produce, except for a few years at most. Of this advantage a generous man would seldom avail himself; and, indeed, in most instances, the advantage must be only imaginary, for it would be overbalanced by the deterioration of his property.

Objections to corn-rents.

Where the circumstances of a landholder, the state of his property, and the wealth and enterprising character of the tenantry, are such as to render long leases, or leases for an indefinite period, expedient, the most equitable mode, in regard to rent, would be to make it rise and fall with the price of corn or other produce. A rent paid in corn is, indeed, liable to serious objections, and can seldom be advisable in a commercial country. It necessarily bears hardest on a tenant when he is least able to discharge it. In very bad seasons his crop may be so scanty as scarcely to return seed and the expenses of cultivation; and the share which he ought to receive himself, as the profits of his capital, as well as the quantity allotted to the landlord, may not exist at all. Though, in this case, if he pays a money rent, his loss may be considerable, it may be twice or three times greater if the rent is to be paid in corn, or according to the high price of such seasons. In less favourable years, which often occur in the variable climate of Britain, a corn-rent would, in numerous instances, absorb nearly the whole free or disposable produce, as it is by no means uncommon to find the gross produce of even good land reduced from twenty to fifty per cent. below an average, in particular seasons. And it ought to be considered, in regard to the landlord himself, that his income would thus be doubled or trebled, at a time when all other classes were suffering from scarcity and consequent dearth; while, in times of plenty and cheapness, he might find it difficult to make his expenses correspond with the great diminution of his receipts. It is of much importance to both parties that the amount of the rent should vary as little as possible from any unforeseen causes, though tenants in general would be perhaps the most injured by such fluctuations.

Plan for converting a corn-rent into money.

To obviate these and other objections to a corn-rent, and to do equal justice at all times to both landlord and tenant, a plan has been suggested for converting the corn into money, adopting for its price, not the price of the year for which the rent is payable, but the average price of a certain number of years. The rent, according to this plan, may be calculated every year, by omitting the first year of the series, and adding a new one; or, it may continue the same for a certain number of years, and then be fixed according to a new average. Let us suppose the lease to be for twenty-one years, the average agreed on being seven years, and the first year's rent, that is, the price of so many quarters of corn, will be calculated from the average price of the crop of that year, and of the six years preceding. If it be meant to take a new average for the second and every succeeding year's rent, all that is necessary is, to strike off the first of these seven years, adding the year for which the rent is payable, and so on during all the years of the lease. But this labour, slight as it is, may be dispensed with, by continuing the rent without variation for the first seven years of the lease, according to the average price of the seven years immediately preceding its commencement, and, at the end of this period, fixing a new rent, according to the average price of the seven years just expired, to continue for the next seven years. Thus, in the course of twenty-one years, the rent would be calculated only three times; and for whatever quantity of corn the parties had agreed, the money payments would be equal to the average price of fourteen years of the lease itself, and of the seven years preceding it; and the price of the last seven years of the old lease would determine the rent during the first seven years of the new one.

The landlord and tenant, it has been thought, could not suffer either from bad seasons or any change in the value of the currency, should such a lease as this be extended to several periods of twenty-one years. The quantity of corn to be taken as rent is the only point that would require to be settled at the commencement of each of these periods; and though this would no doubt be greater or less, according to the state of the lands at the time, yet it may be expected that, in the twenty-one years preceding, all the tenant's judicious expenditure had been fully replaced. Instead of the twofold difficulty in fixing a rent for a long lease, arising from uncertainty as to the quantity of produce, which must depend on the state of improvement, and still more perhaps from the variations in the price of that produce, the latter objection is entirely removed by this plan; and in all cases where land is already brought to a high degree of fertility, the question about the quantity of produce may likewise be dispensed with.

Considered as applicable to leases of nineteen or twenty-one years.

Upon this plan we shall take leave to observe, that if it be applied to leases of nineteen or twenty-one years, the inconvenience resulting from uncertainty as to the amount of rent, as well as other difficulties which must necessarily attend it, would be as great perhaps as any advantages which it holds out to either of the parties. If it be said that a rent determined by a seven years' average could not suddenly nor materially alter, this is at once to admit the inutility of the contrivance. The first thing which must strike every practical man is, that corn is not the only produce of a farm, and, in most parts of Britain, perhaps not the principal source from which rent is paid; and there is no authentic record of the prices of butcher-meat, wool, cheese, butter, and other articles in every county to refer to, as there is of corn. This is not the place to inquire whether the price of corn regulates the price of all the other products of land, in a country whose statute-books are full of duties, bounties, drawbacks, &c. to say nothing of its internal regulations; but it is sufficiently evident, that, if corn does possess this power, its price operates too slowly on that of other products, to serve as a just criterion for determining rent on a lease of this duration. Besides, in the progress of agriculture, new species or varieties of the *cerealia* themselves are established even in so short a period as twenty-one years, the price of which may be very different from that of the corn specified in the lease. What security for a full rent, for instance, would it give to a landlord, to make the rent payable according to the price of barley, when the tenant might find it more for his interest to cultivate some of the varieties of summer wheat? or according to the price of a particular variety of oats, when, within a few years, we have seen all the old varieties superseded, throughout extensive districts, by the introduction of a new one, the potato-oat, which may not be more permanent than those that preceded it? There may be no impropriety in adopting this plan for ascertaining the rent of land kept always in tillage, but it would be idle to expect any important benefits from it during such a lease as we have mentioned. In some instances it is the practice to agree for a certain rent in money, which does not vary; and another portion is determined from time to time by the price of corn, the quantity and kinds of the corn only being previously fixed by the lease. This, we think, is a better plan than to make the whole rent vary with the price of corn.

With regard to much longer leases, this plan will no doubt diminish the evils which we think are inseparable from them, but it cannot possibly reach some of the most considerable. Its utmost effect is to secure to the landholder a rent, which shall in all time to come be an adequate rent, according to the state of the lands and the mode of cultivation known at the date of the lease. But it can make no provision that will apply to the enlargement of the gross produce from the future improvement of the lands themselves, or of the disposable produce from the invention of machinery and other plans for economizing labour. Old corn-rents, therefore, though much higher at present than old money-rents, are seldom or never so high as the rents that could now be paid on a lease of twenty-one years. But, independently of these considerations, which more immediately bear upon the interests of the parties themselves, one insuperable objection to all such leases is, that they partake too much of the nature of entails, and depart too far from that commercial character which is most favourable to the investment of capital, and consequently to the greatest increase of land produce.

Covenants of lease.

A lease for a term of years is not, however, in all cases a sufficient encouragement to spirited cultivation: its covenants in respect to the management of the lands may be injudicious; the tenant may be so strictly confined to a particular mode of culture, or a particular course of crops, as not to be able to avail himself of the beneficial discoveries which a progressive state of agriculture never fails to introduce. Or, on the other hand, though this is much more rare, the tenant may be left so entirely at liberty, that either the necessity of his circumstances during the currency of the lease, or his interest towards its expiration, may lead him to exhaust the soil, instead of rendering it more productive. When a lease therefore is either redundant or deficient in this respect—when it either permits the lands to be deteriorated or prevents their improvement—the connection between landlord and tenant is formed upon other views, and regulated by some other principle, than the general one on which we think it should be founded.

Notwithstanding the high authority of Adam Smith, restrictive covenants are always necessary to the security of the landlord, and in some cases beneficial also to the tenant. Their expediency cannot well be questioned in those parts of the country where an improved system of agriculture has made little progress. A landholder, assisted by the advice of experienced men in framing these covenants, cannot adopt any easier or less offensive plan for the improvement of his property, and the ultimate advantages of his tenantry. Even in the best cultivated districts, while farms continue to be let to the highest responsible offerers, a few restrictive covenants cannot be dispensed with. The supposed interest of the tenant is too feeble a security for correct management, even during the earlier part of a lease; and in the latter part of it, it is thought to be his interest, in most cases, to exhaust the soil as much as possible, not only for the sake of immediate profit, but frequently in order to deter competitors, and thus to obtain a renewal of his lease at a rent somewhat less than the lands would otherwise bring.

With tenants at will, and such as hold on short leases, restrictive covenants are more necessary than with tenants on leases of 19 or 20 years; but in many instances they are too numerous and complicated, and sometimes even inconsistent with the best courses of modern husbandry. The great error lies in prescribing rules by which a tenant is positively required to act; not in prohibiting such practices, and such crops, as experience has not sanctioned. The improved knowledge and the liberality of the age have now expunged the most objectionable of these covenants; and throughout whole counties, almost the only restriction in reference to the course of crops is, that the tenant shall not take two culmiferous crops, ripening their seeds, in close succession. This single stipulation, combined with the obligation to consume the straw upon the farm, and to apply to it all the manure made from its produce, is sufficient not only to protect the land from exhaustion, but to insure, in a great measure, its regular cultivation; for half the farm at least must in this case be always under either fallow or green crops. The only other necessary covenant, when the soil is naturally too weak for carrying annual crops without intermission, is, that a certain portion of the land shall be always in grass, not to be cut for hay, but depastured. According to the extent of this will be the interval between the succession of corn crops on the same fields: if it is agreed that half the farm, for instance, shall always be under grass, there can be only two crops of corn from the same field in six years. In this case, not more than two-sixths being in corn, one-sixth in green crops or fallow, and three-sixths in clovers or grasses, it becomes almost impossible to exhaust any soil at all fitted for tillage. There are few indeed that do not gradually become more fertile under this course of cropping. It is sufficiently evident that other covenants are necessary in particular circumstances, such as permission to dispose of straw, hay, and other crops from which manure is made, when a quantity of manure equal to what they would have furnished is got from other places, and a prohibition against converting rich old grazing lands or meadows into corn-lands. In this place we speak only of general rules, such as are applicable to perhaps nine-tenths of all the arable land of Britain, and such as are actually observed in our best cultivated counties.

For the last four years of a lease the same covenants are generally sufficient, only they require to be applied with more precision. Instead of taking it for granted that the proportion of the farm that cannot be under corn will be properly cultivated, from the tenant's regard to his own interest, it becomes necessary to take him bound to this effect in express terms; the object generally being to enable the tenant, upon a new lease, to carry on the cultivation of the lands, as if the former lease had not terminated. What these additional stipulations should be, must depend in part on the season of the year at which the new lease commences, and in part on the course of crops best adapted to the soil and the particular circumstances of every farm.

Enlargement of farms.

3. The enlargement of farms to such a size as admits of arrangements and machinery for saving labour, is the natural consequence of the progress of agriculture, and the acquisition of capital by cultivators, and becomes, in its turn, the cause of further improvements. We have not room to examine here the various objections to large farms which were urged by Dr Price, Lord Kames, and most of the economical writers of the last century. Much stronger reasons, certainly, than any that have been hitherto advanced must be required to justify the interference of the legislature with the rights of the agricultural classes,—with that of a landholder to draw the greatest revenue from his property, and with that of a farmer to extend his concerns as far as his capital and abilities will permit. Even though it should be conceded to Dr Price, that a given extent of land yields a greater produce in the hands of several small farmers than of one great farmer, it still remains to inquire, what part of that produce can be spared for the general consumption,—and whether the labour of these people might not be employed with more advantage than on such minute portions of land as yield, even in the best seasons, little more than food for their own subsistence. In Britain, of which the families employed in agriculture are to those of the whole population only as 1 to 3, and in which the proportion of lands cultivated, or that may be cultivated, is not four acres to every individual, the great object ought certainly to be, to increase the *disposable* produce of the country for the supply of the general population.

The grand objection to large farms, that they depopulate the country, is not supported by facts. The population of the country has not only greatly increased since the enlargement of farms, but this increase appears to have been little less than that of the town population. The fact is, the increase of the rural population has been in a greater ratio than that of the towns, in those counties, such as Northumberland, where very large farms abound, and where, indeed, as is usually the case, this state of things is combined with a spirited and productive system of agriculture. Even in Lancashire, the ratio of increase in the 10 years from 1801 to 1811 was only two per cent. in favour of the towns; but no one will ascribe this to the enlargement of farms. The truth seems to be, that wherever agriculture has made the greatest progress, whatever may be the size of farms, the increase of employment has been attended with a corresponding increase of population; and that the ratio of increase has been kept down below that of towns by no other causes than the stationary condition or slow progress of agriculture in some parts, and the superior allurements of manufactures and commerce in others.

It is further to be remarked, that, throughout the whole of the arable districts of Scotland, the number of people is proportionally greater on large than on small farms. The number of hands required on the former is too great to be lodged in the farmer's own house; and therefore, on all such farms, cottages are built for their residence. These cottages are generally inhabited by married men, whose families find employment in hoeing green crops, and other easy work, from a very early age. In the less-improved counties, on the other hand, where small farms still prevail, unmarried servants are preferred, as, on such farms, there is little or no employment for the families of married servants. Our limits do not permit us to inquire how far the poor-laws of England operate against the employment of married servants, living in cottages on every farm; but the happy effects of this arrangement are manifest in the south-eastern counties of Scotland, as we shall notice immediately.

Married farm-servants.

Cottage-farms.

The possession of land is held by some writers to be so important, with a view to the comforts of the labouring classes, as well as to the increase of the rural population, that they have not been contented with objecting to large farms, but have proceeded to recommend what are called *cottage-farms*, for country labourers generally. Of this plan we might say at once, that it must be limited everywhere by the demand for labour; and that, wherever such small allotments are required by the state of agriculture, they will gradually be formed from motives of interest, without the necessity of any higher control. They are at this time common in many parts of Britain; and a different system has been established in other parts, for no other reason than because of its superior advantages to all concerned. Yet as cottage-farms bear a very plausible appearance in the eye of speculative men, it seems necessary to offer some further remarks on a question which has been so often agitated.

If every labourer had a comfortable cottage and four acres of land at a low rent, as recommended by some of the correspondents of the Board of Agriculture, there is reason to believe that his condition might be much improved for a few years, supposing the demand for labour to continue the same as at present. Even the colonies which this class would every year send forth in quest of new cottages might be supplied for a time; and though the wages of labour would sink very fast, still this premium might enable the labourers to multiply with little interruption for several generations. At last, however, the multiplication of cottage-farms must necessarily stop, and a great proportion of the people, without land and without the means of employment, would either sink into helpless misery, or be driven by despair to the commission of every species of enormity. Such was the state of England at the breaking up of the feudal system, the policy of which also was to increase the number of the people, without regard to the means of their employment; and such, though in a much less degree, is the present state of those parts of the united kingdom in which cottage-farms are the most prevalent.

The whole question, we think, is capable of being most satisfactorily decided by an appeal to the plain mercantile criterion of rent. If a hundred labourers, each of them possessing four acres, can pay a higher rent than one farmer can pay for the whole four hundred, buildings, fences, and repairs being estimated, we can see no reason why they should not be preferred; but if this be not the case, we are greatly at a loss to conceive with what justice landholders can be called upon to submit to sacrifices which no other class of the community is ever expected to make. We might, with just as much reason and justice, require a manufacturer to employ a certain number of hands in proportion to the amount of his capital, however unprofitable to him might be their labour.

Two classes of cottagers.

In all our best agricultural counties there are two sorts of cottages, occupied by two distinct classes of labourers. Of the first sort are the small agricultural villages, where those mechanics and other labourers reside, who could not find full employment on any one farm. To such men small farms are advantageous, or otherwise, according to the nature and the constancy of their employment.

The other class of cottagers, to which we have already alluded, are ploughmen and other servants employed throughout the year on a particular farm. To these men small possessions of land are almost as unsuitable as they would be to a country gentleman's domestics. But a small garden is usually attached to each cottage; and they are often allowed to keep a cow as part of their wages, not upon any particular spot of their own, but along with their master's cows. Their fuel is carried home by their master's teams; and a part of his own field, ready dressed, is assigned them for raising potatoes, flax, or other crops, for their families. Thus, with little risk from the seasons or markets, and without any other demand on their time than a few leisure hours will satisfy, these people enjoy all the advantages which the occupancy of land can confer on a labourer. And there is not a more useful, we may also add, a more comfortable, body of men among the industrious classes of society.

To give this class of labourers four acres of land along with every cottage, would be to render them bad servants and worse farmers, and either a nuisance to the person on whose farm they reside, or his abject dependents for employment. The only proper residence for men who do not choose to engage, or are not wanted as constant labourers, is in such central agricultural villages as we have just mentioned, and not on separate farms, where they are excluded from the general market for labour.

Poor colonies of Holland.

But it has been lately suggested, that our poor soils might be cultivated by another description of cottagers, with benefit to the public generally, by the improvement of such lands and the diminution of the poor-rates, as well as with profit to those who advance the necessary capital. As far as there has yet been time to judge, some well-digested and economically executed plans of this kind have been very successful in Holland. The leading points deserving notice in these poor colonies are, the amount of capital sufficient to purchase the land, and to defray the necessary expense of buildings and stock; its division into farms of seven acres; the vigilant superintendence exercised over the colonists, whose operations are almost all performed by manual labour, and much of whose time is employed in collecting manure; their moral and religious instruction; and the surplus produce obtained to replace the original outlay, and afford a permanent clear income or rent in all time coming. The most considerable of these colonies was established at Frederick's Oord in 1818, at an expense of L.22. 6s. 7d. for every individual; and after a few years' experience, the annual excess of produce over subsistence for each family was found to be L.8. 2s. 4d. after allowing for a rent of 12s. per acre. The whole outlay, it was calculated, would be replaced in sixteen years. The crops raised are barley, clover, potatoes, rye; and about one acre out of the seven is kept permanently in grass. The only sorts of live stock seem to be cows and pigs. About the end of 1825 the number of colonists composing this settlement was 6778, and the population of all the other colonies of this description in Holland was then estimated at more than 20,000.

The founders of one of these, formed near Antwerp in 1822, soon after made a contract with government to maintain 1000 mendicants for sixteen years, at the rate of 35 guilders, or L.2. 18s. 4d., for each per annum; and more recently an individual possessing a portion of heath land near Bruges agreed to take another thousand on the same terms. But for a particular account of these colonies we must refer to Jacob's *Tracts on the Corn-Trade and Corn-Laws*, 1828.

But with regard to the size of farms in the agriculture of this country, we may add, that of all the witnesses examined before the committees of Parliament on the corn-laws, there was only one whose sentiments were opposed to the general feeling of all well-informed men, regarding the advantages that have resulted from the enlargement of farms. We shall therefore content ourselves with noticing what appears to be the natural progress in the size of farms,—the circumstances which prevent any possible enlargement of them from ever becoming injurious to the public,—and the influence which perfect liberty in this respect has exerted in the improvement of our agriculture.

Progress in the size of farms.

During the feudal system, that part of an estate which was not cultivated under the direction of the proprietor himself, was let out in small allotments to his vassals, from whom he received military or other services, or a portion of the produce, in return. In those times of turbulence and insecurity, the power of the chief mainly depended on the number of his tenants; and it was therefore his policy to increase them as much as possible, by dividing his land into very small possessions. That they might assist one another in their rural labours, and in repelling the incursions to which they were incessantly exposed, these tenants were collected in a village near the castle of their lord. A certain extent of arable land was appropriated to it, on which they raised corn, and a much larger tract of waste or wood land, where their live stock pastured in common. Spirited cultivation could never be introduced into this system of occupancy; nothing more than the means of subsistence was sought by the tenantry; and power, not revenue, was the great object of the landholder.

For a long time after the fall of the feudal system, this arrangement continued to prevail with little alteration; its vestiges are still to be traced in every part of Britain; and it exists in several counties, though in a modified form, even at the present time. The common fields and commons of England, and the *infield* and *outfield* divisions of Scotland, did not originate in any regard for the welfare of the lower classes, to whom the tenancy of land is now thought to be so necessary, but in the anarchy and oppression of those dark ages in which all the landed property of the island was engrossed by a few great barons.

When these petty sovereigns were at last overthrown, and when commerce and the arts held up to them new objects of desire, and to their depressed tenantry new modes of employment and subsistence, the bond which had hitherto connected the landholder and cultivator became more and more feeble, and it was soon found necessary to establish it upon other foundations than those of feudal protection and dependence. The connection between landlord and tenant came gradually and generally to assume that commercial form, which is at once most conducive to their own interests and to the general welfare.

One great obstacle to this change was the want of capital ready to be embarked in agricultural pursuits. Under the feudal system there could be little or no accumulation. Property in land was the only means of obtaining the command of labour, and a share of the produce its only recompense. Accordingly, upon the breaking up of the feudal system, large tracts were taken into the immediate possession of landholders themselves, because no suitable tenants could be found. The constant superintendence required in cultivating corn-lands, as well as the absurd restrictions of those times upon the corn-trade, and the constant demand for British wool on the Continent, occasioned these tracts to be laid to grass and pastured with sheep. Hence the grievous complaints, during two centuries, of the decay of husbandry and farm-houses.

But this resource of land proprietors was effectual only on soils of an inferior description: on good arable land, the only method by which a part of the produce could reach them in the shape of rent was to enlarge their farms. The old occupiers were too numerous to spare any considerable part of the produce, and generally too indolent and unskilful to make any great exertions to augment it. In these circumstances the landholder must either have virtually abandoned his property, or reduced the number of its inhabitants, who were no longer permitted by law to make him that return which had been the original condition of their tenures. But the population of the towns was now gradually increasing, and it was necessary, for the supply of their wants, as much as for the benefit of the landholders, that a large disposable produce should be obtained from the soil. The measure of enlarging farms was, therefore, in every view, indispensable. Even such of the tenants themselves as it was necessary to displace might have felt but a slight and temporary inconvenience had the change been gradual. Some of them would have found employment in towns, and others as hired labourers and artisans in the country. The dismission of the small tenants seems, however, to have been the occasion of much misery; for, in the sixteenth century, manufactures and commerce had made comparatively little progress in Britain. In the present times, any length to which the private interest of landholders could operate in this manner would, in a national point of view, be too inconsiderable to deserve notice.

It is in this way that farms have been enlarged. The most skilful and industrious of these small tenants were naturally preferred, and their possessions afterwards extended as their capital increased. The consequence everywhere has been, a better system of cultivation, affording a higher rent to the land proprietor, and a greater supply of land produce for the general consumption.

But it is only for a time, and to a very limited extent, that the enlargement of farms can proceed. The interest of the landlord, which gave the first impulse, is ever vigilant to check its progress, when it is attempted to carry the measure beyond due bounds. It is in this that the security of the public consists, if it were ever possible that the public interest should be endangered by the enlargement of farms. Accordingly, in most of our counties, a few tenants, of superior knowledge and capital, have been seen to hold considerable tracts of land, which after a few years were divided into a number of separate farms. The practice of these men is a lesson to their neighbours; and their success never fails to bring forward, at the expiration of their leases, a number of competitors. Whenever skill and capital come to be generally diffused, there can be few instances of very large farms, if a fair competition be permitted. No individual, whatever may be his fortune and abilities, can then pay so high a rent for several farms, each of them of such a size as to give full room for the use of machinery and other economical arrangements, as can be got from separate tenants. The impossibility of exercising that vigilant superintendence which is so indispensable in agricultural concerns, cannot long be compensated by any advantages which a great farmer may possess. His operations cannot be brought together to one spot, like those of the manufacturer; the materials on which he works are seldom in the same state for a few days; and his instruments, animated and mechanical, are exposed to a great many accidents, which his judgment and experience must be called forth instantly to repair.

It has been said, indeed, that a great farmer may pay a higher rent, because he saves the family expenses of a number of small tenants. But from what fund do these tenants maintain their families? It ought to be either from the profits of their capital, or the wages of their labour, or from both combined, and certainly not from the landlord's just share, in the shape of an abatement of rent. If they cannot pay so high a rent, it must be because their capital and labour are less productive to the public than those of the large farmer. Such men might, in most cases, be employed with more advantage, even to themselves, in some other profession.

The various other reasons assigned for the great enlargement of farms are equally nugatory. There is generally no saving to the landlord in buildings and fences; and a very small difference of rent will pay for the trouble of keeping accounts, and settling with twenty tenants instead of one. The fact certainly is, that the principal, if not the only reason, why farms have been enlarged, is, the higher rent paid by their occupiers. To pay this rent, they must bring to market more produce; and this they are enabled to do, by the distribution of their crops and live stock to suitable soils and pastures; by an economical arrangement and regular succession of labour throughout the year; by the use of machinery; and, still more than all, perhaps, by the investment of capital in those permanent improvements which augment both the quantity and value of their products. Rent, in fact, is an almost unerring measure of the amount of the free produce; and there is no better criterion for determining whether a tract of country be laid out in farms of a proper size, than the amount of the rent paid to its proprietors. Their interest is, in this instance, completely identified with that of the great body of the people.

Size of farms different according to the nature of the land.

If we examine the various sizes of farms in those districts where the most perfect freedom exists and the best management prevails, we shall find them determined, with few exceptions, by the degree of superintendence which they require. Hence pastoral farms are the largest; next, such as are composed both of grazing and tillage lands; then, such rich soils as carry cultivated crops every year; and, finally, the farms near large towns, where the grower of corn gradually gives way to the market-gardener, cultivating his little spot by manual labour. The hills of the south of Scotland are distributed into farms of the first class; the counties of Berwick and Roxburgh into those of the second; and the smaller farms of the Lothians and of the Carse of Gowrie, where there seems to be no want of capital for the management of large farms, are a sufficient proof of the general principle which determines the size of farms.

It must readily appear from these remarks, in what manner the enlargement of farms, or rather the absence of all restraint upon the transactions of the landholder and farmer, has promoted the improvement of our agriculture. To confine the practice of this important art to the manual labour of men in a state of poverty and dependence, would be no less injudicious, and much more ruinous in a national point of view, than to destroy all the extraordinary inventions for saving labour in our manufactures. The effects of capital and machinery are the same in both departments. But no man of education, and in circumstances much above the condition of a common labourer, would ever engage in farming, if his concerns could be no farther extended than to fifty or one hundred acres held at rack-rent; and on such farms there is no room for the most economical machinery,—for convertible husbandry, by which land is preserved in its highest fertility,—or, indeed, for any of those arrangements which approach in their effects to the division of labour in other arts.

Besides those general causes of the improvement of the agriculture of Britain, arising from the division of landed property,—the existence of a distinct class of professional farmers, whose rights are secured by leases, and whose exertions are stimulated by a rent settled by competition,—and the opportunities held out for the investment of capital as far as it promises to be profitable,—there are several others of a more limited or temporary nature, but which it is only necessary barely to mention. The most important of these is the extent of the British market, which for many years has required more corn than was grown in the country. The gradual rise of price, which was the necessary consequence of this, and still more the enormous prices during the late war, in which foreign supplies were obtained with difficulty or altogether withheld, have contributed in no small degree to the improvement of our own ample resources. This has been further promoted by the facility and expedition with which commodities of every kind are transported by means of canals, roads, and railways. We may add, that the liberal accommodations afforded by the banking establishments during the suspension of cash payments enabled British farmers to operate upon extensive wastes, of which the improvement must be advantageous in a national point of view, though, in consequence of the change that has taken place since the peace, it may not in many cases have been profitable to individuals.

Rapid progress of agriculture in Scotland.

The progress of a correct system of agriculture is generally allowed to have been more rapid in Scotland than in England; the effects, at least, have been more conspicuous. Not only the rents paid in Scotland, but the actual produce per acre, and still more the disposable produce, seem to be greater than in England, wherever the comparison is made with land of a similar quality, and with an allowance for the difference in climate and markets. The remark naturally leads us to advert to some circumstances which seem materially to impede the agricultural improvement of the country, particularly the southern part of it; and with one or two observations on this head we shall conclude this article.

The low state of agriculture in many parts of Britain, with the advance in the price of corn, on the one hand, and the abundance of capital displayed in the manufactures and commerce of the country, on the other, are circumstances sufficient to convince every reflecting mind that there is no want either of means or of inducements to the improvement of our territory. It is impossible, indeed, to travel through the country in any direction, without feeling a strong conviction that there must be some serious obstacles to the investment of capital in agriculture. The circumstances which seem to have the most weight in determining men of capital to engage in any particular profession, are, the security and productiveness of that capital, the power of transferring it, and the degree of estimation in which the profession is held by the public. To the absence of these essential requisites we must ascribe the backward state of this art, notwithstanding all the other motives, both of a public and private nature, which have long existed for its advancement.

To the class of drawbacks upon agriculture, and impediments to its improvement, belong tithes, poor-rates, payments in the shape of fines, and services exacted by the lords of manors; entails; tenancy at will, or on very short leases; unfair restrictions on the tenant as to the disposal of his lease, and as to the management of the lands during its currency; the game-laws; and the complicated regulations under which commons and common fields are cultivated, and the great expense required to place them in a state of severalty.

It appears that nearly three-fourths of the lands of England and Wales are exposed to claims which wrest from the husbandman one-tenth of the gross produce of his labour and capital, and this whether the remainder of the produce be or be not sufficient for his remuneration. Though no rent were paid for poor soils, this burden alone would effectually prohibit their correct cultivation; and even in the case of rich soils, tithes diminish the rent so considerably as to make it the interest of landholders, in many parts of England, to restrain their tenants from converting grass-lands into tillage; that is, from placing them under the most productive management for the community, both in regard to the supply of food and of employment.

Nothing required but the removal of obstacles.

To the enlightened inquirer it must appear abundantly clear, that all plans for the extension and improvement of British agriculture must prove ineffectual so long as these capital obstacles are left untouched; and that their removal is all that need be done, and all that ought to be done by a wise government, for securing an abundant supply of the first necessaries of life. Let all land be held and occupied in severalty; let it be exempted from all indefinite exactions, particularly such as diminish or altogether absorb the just returns of capital and industry; let the connection between the land proprietor and the farmer be everywhere formed upon equitable principles, to the exclusion of all remnants of feudal ideas, all notions of favour and dependence, and all obligations that do not appear in the lease itself, or are not imposed by the general principles of law; let the rights of a tenant be so far enlarged as that he may be enabled to withdraw his capital by a transference of his lease, and to regulate the succession to it after his death; then there can be little doubt that a large part of the disposable capital of the nation, now embarked in much less profitable pursuits, would of its own accord turn towards the improvement of our lands, and thus furnish employment and subsistence for our population, secure from the caprice of fashion and the rivalry and jealousy of other countries. (D.)

EXPLANATION OF THE PLATES.

PLATE V.

Swing-plough.

Figures 1 and 2 are different views of the *Swing-plough*, made wholly of iron; fig. 3, the body in one entire piece of cast-iron, which is attached to a wooden beam with screw-bolts.

Grubber.

Fig. 4, a plan of the *Grubber*, the inner frame made to rise upon hinges, so as to keep the tines or coulters from the ground when it is removed from one field to another, and supported by iron stays. Fig. 5, section of the same, the fore wheel dragged in going down hill. Fig. 6, three different views of the coulters. Fig. 7 and 8, Drill-harrow. Common harrows. Improved harrows.

a *Drill-harrow*, to work between the rows of plants, and made to contract or expand according to the width of the interval. Fig. 9, 10, *Common Harrows*, each drawn by its own horse, though two and often three work together. Fig. 11 and 12, *Improved Harrows*, in general use for covering grass-seeds, by which all the ruts or tracks are made equidistant.

Plate VI.

Finlayson's self-cleaning patent plough.

Finlayson's Self-cleaning Plough.—Fig. 1, *a*, the beam, and *b*, the coulter, curved to form in their junction a segment of a circle of about 18 inches diameter; *c*, a share of a new form for moss or meadow land; the feather or cutting edge 26 to 30 inches long, and standing at an angle of about 20 degrees with the land-side. A little fin, as represented at *e*, is screwed into the end of this share: its use is to cut the first two furrow-slices of each ridge clean out; for if any part be left uncut in land of this description, the furrow, from its elasticity, will fall back to its original position. Fig. 2, a view of the plough reversed: *a*, the coulter by itself, to show a piece of plate-iron welded on it above the cutting surface, which slips up in front of the beam, and prevents a niche being formed between them when the coulter is let down, wherein root-weeds or other substances would lodge as they are forced upwards: *b*, a view of a share.

The American hay-rake.

Fig. 3. *The American Hay-Rake.*—A, the head or beam; B, the teeth inserted in the beam; C, the frame to which the horse is attached; D, catches to be loosened by the person who guides the rake, so as to raise it when the teeth are full, and allow the head and teeth to revolve, passing the *rest*, F, freely; after which the catches are replaced, and the work proceeds without stopping the horse; G, the connection road, which gives great lever power in raising the *rest*, and regulates the height at which the machine must revolve.

Finlayson's self-cleaning harrow.

Fig. 4. *Finlayson's Self-cleaning Harrow.*—*a*, the teeth or tines, coming up by a circular sweep to *b*, and then continued upwards, and afterwards turned down and inserted horizontally into the frame-work; the part at *b*, where all weeds or other matters fall off, being about 9 or 10 inches from any part of the frame-work: *c*, a lever, bent back and jointed at *e*; *d*, the fore wheel, attached to the lever by a swivel joint, whereby it plays round when the harrow is turning. When the lever, *c*, is put down in the lateral spring, *f*, this fore wheel is depressed, and the first row of tines thrown out of the ground; it is therefore used at turning, being then put down to the lowest opening at *i*, and it is also used to regulate the depth of the fore tines when working, by being placed in any of the openings above *f*; *g*, the hind wheels, brought up or down by a male-screw, *h*, passing through the axle, and thereby regulating the depth of the hind tines. The tines can be readily taken out when repairs are necessary.

Morton's revolving harrow.

Fig. 5. *Morton's Revolving Harrow.*—X, one of the wheels (W) brought forward and placed upon the axle at C, when the harrow is to be removed from one field to another; Y, a castor or truck-wheel placed at the back of the harrow at B, to facilitate its removal from one field to another. In putting this implement together, 1, 2, 3, 4, denote the bolts of the iron frame, and 5 that of the beam; the sword, R, connects the axle and beam, and at D the frame is locked upon the axle. The rake behind is attached to the frame by two iron rods, and secured by a forelock.

The Hainault scythe.

The Hainault Scythe.—Fig. 6, the scythe A B E, the handle about 26½ inches long, of which the curved part is 5½ inches, and the broad part at A 4 inches; at *a* there is a leathern loop through which the fore finger is passed. The blade from E to F is 21 inches long, and 2⅞ths broad, and the back ¼th of an inch thick. Fig. 7, the crotchet or hook which the workman uses with his left hand to gather the quantity of corn he intends to cut, to support it while he is cutting, and lay it afterwards behind him; the handle, from G to H, is 3 feet 5 inches long, and the iron hook, from H to L, near 11 inches.

Cart with frames.

Fig. 8, a close-bodied *two-horse* cart, with frames for carrying hay and corn in the straw. The frames at other times are withdrawn.

Plate VII.

Double mould-board plough.

Fig. 3. A B C, a *Double Mould-board Plough*, with its mould-boards taken off, and expanding arms applied with circular coulters, for paring the edges of the drills; D D, the expanding arms, which are removed when the mould-boards are put on; E E, the circular coulters; P, a back view of a coulter; F, a scuffle, two of which are applied at pleasure, in place of E E, the circular coulters. Fig. 1 and 2, G G, the mould-boards taken off.

Paring plough.

Fig. 4, a *one-horse Paring Plough*, to which the beam and handles, A C (fig. 3), are applied when taken from the body B, and secured by three screwed bolts at 1, 2, 3; I, the coulter for the paring plough.

Drill-harrow.

Fig. 5, a *Drill-harrow*, to which also the beam and handles, A C (fig. 3), are applied in the same manner; K K K, scuffles or hoes, which may be applied to the harrow in place of tines. Fig. 6, part of a common plough, with a wheel-brake attached; A, the axle screwed to the plough; B B, the screws; C, the wheel. Fig. 7, a *Roller* to be worked by two horses abreast, made of cast-iron.

Turnip sowing-machine.

Fig. 8. *The Improved Turnip Sowing-Machine.*—A, the seed box; B, manure boxes, for crushed bones or other matters; C, two large concave diverging rollers, which accommodate themselves to different widths of the drills or ridgelets, carrying along with them the seed and manure boxes, which distribute their contents in regular succession on the tops of the drills; D, two small rollers, also concave, for regulating the depth at which the seed and manure are deposited in the ground; E, a coulter, for receiving and discharging the manure conductor, and F, a similar one for the seed.

Plate VIII.

Smith's reaping-machine.

Fig. 1 represents a profile of *Mr Smith's Reaping-Machine*, complete and in operation. It will be seen by this figure and fig. 2 (which is a bird's-eye view of the machine), that the horses are yoked one on each side of a pole, which runs back from the frame of the carriage. The person who drives the horses and directs the machine walks behind, having command of the horses by a set of common plough-reins, and directing the machine by a hold of the end of the pole. The horses draw from a cross bar at the end of the pole by common plough chains, the back-weight of the carriage resting on their common cart-saddles by means of an apparatus such as is used in curricles. On the fore part of the carriage is hung a horizontal circular cutter, surmounted by a drum, the blade of the cutter projecting 5½ inches beyond the periphery of the lower end of the drum. When the carriage is moving forward, a rapid rotatory motion is communicated to the cutter and drum, from the motion of the carriage-wheels, by means of a series of wheels, pinions, and shafts. The diameter of the cutter projects beyond the carriage-wheels on each side, so as to cut a breadth sufficient to allow the carriage and horses to pass along without risk of treading down the uncut corn. The corn being cut by the rapid motion of the cutter, the lower ends rest upon the blade of the cutter, and the upper parts coming in contact with the drum, the whole is carried round, and thrown off in a regular row at the side of the machine. The lower ends taking the ground first, the heads fall outwards, the stalks lying parallel to each other, and at nearly a right angle to the line of motion of the machine. The corn lying thus in regular rows, is easily gathered into sheaves by the hand, or by a rake, fork, or other convenient instrument, and is bound in the usual way.

Minute Description of the Plate.

Fig. 2. A, the frame of the carriage, made of oak or other strong wood, and put firmly together by bed-bolts screwed into the cross bars B. C, the pole, made fast to the cross bars. D, a cross bar, at the extremity of the pole, from which the horses pull; this bar is of iron, in order to give sufficient weight on the horses' backs. E, the carriage-wheels, 5 feet in diameter, and 6 inches broad in the tread. F, the cutter, 5 feet 4 inches in diameter, composed of six segments bolted to an iron ring, 1¼ inch broad and ¼ inch thick, which ring is connected to the foot of the upright spindle by the cross arms, G.—Fig. 6 shows one of these segments on a larger scale: *a* is of hard wood, 3½ inches broad and 1 inch thick; *b b* are of German steel, and of a scythe temper, 3½ inches broad, and ¼ inch thick at the back; they overlap the wood, to which they are rivetted, 1½ inch, their upper side being flush with the wood; *d*, holes through which the ring-bolts pass. Fig. 5 is a transverse section of fig. 6.—H, fig. 2, a conical drum of slight tin-plate or basket-work, whose lower periphery is 5 inches within the edge of the cutter, but whose upper periphery extends as far as that of the cutter. This drum is two feet deep, connected to the same ring with the cutter below, and to the spindle above by another ring, with four arms. The drum is covered on the outside with canvass, on which perpendicular strips of soft rope are sewed, being one inch thick, and three or four inches apart: these give sufficient friction to carry round the cut corn, whilst, from their softness, they have no tendency to shake or thresh it. The horses are yoked to the cross bar, D, by common plough-chains. The breeching-chains are linked to the draught-chains, and a breast-chain, which passes through a ring made fast to the *hames*, is drawn up to an eye at N. Fig. 4 is an inside view of the naves of the carriage-wheels; *a*, a tranverse section of the axle; *b*, a ratch-wheel, made fast on the square of the axle; *c*, catches, movable on pivots, made fast to the nave; *d*, slight springs to keep the catches in gear. By this means the wheels carry the axle in revolution with them when the carriage is moved forward, but move round upon it when the carriage is drawn in a contrary direction. This construction is necessary to facilitate the turning of the machine. The axle moves in two cast-iron seats with caps, on which the frame of the carriage rests. A wheel, O (fig. 2), of 24 teeth of 1¼ inch pitch, works into an intermediate wheel of the same dimensions. This wheel is in gear of a pinion of 12 teeth, fast on the end of the cross shaft Q. At the centre of this shaft, two bevelled wheels, R, with long sockets, are fitted loose. These wheels have each 28 teeth of 1½ inch pitch: in the bosom of these is a double reversing catch, which will be best explained by reference to fig. 3, which is a longitudinal section of the cross shaft with the wheels and catch; *a*, the shaft; *b*, the pinion; *c*, the bevelled wheels, R, of fig. 2, having long sockets fitted loose on the shaft; *d*, a double catch, which is movable longitudinally on the shaft, but is carried in revolution with it, by means of the feather, *e*, upon the shaft, fitted into a corresponding groove in the catch. This catch can be put into gear of either of the wheels at pleasure, by means of the lever, *s* (fig. 2), movable on a stool at T, and kept to its place when set, by notches in an iron stand at U. Both of the wheels are constantly in gear of a pinion of 14 teeth, V (fig. 2), and *f*, (fig. 3). By thus reversing the gearing, the cutter and drum can be made to revolve to the right or left, and consequently will throw the cut corn to either side of the machine at pleasure. On the opposite end of the shaft, W (fig. 2), on which the pinion V is fixed, is a bevelled wheel X of 28 teeth, in gear of a pinion of 14 teeth on the upright axle, (fig. 7 and 8). The velocity is so raised by these wheels and pinions, that the cutter makes 128 revolutions per minute when the machine moves at the rate of 2¾ miles per hour, the edge of the cutter passing through 32 feet per second. The upright spindle, shown in fig. 1 and 8, has three bearings, one in a brass bush fixed in an iron stay-frame, *b*; a second bearing in a wooden bush with a cap on the front of the cross bar at *c*; and a third in a socket resting on the small wheels, *d*. These wheels serve to keep the cutter always at an equal height from the ground. The particular construction of these wheels, with that of the frame and socket, will be better understood by reference to fig. 7 and 8. Fig. 8, a perpendicular section of the foot of the upright spindle and socket; *a*, the spindle; *b*, the socket; *c*, a groove in the spindle, into which the points of two screw pins, *d*, passing through the sides of the socket, are fitted. These are necessary to keep the spindle in its place, and to bear up the wheels when the spindle is raised. Fig. 7 is a bird's-eye view of the wheels and carriage, with a transverse section of the socket and spindle; *a*, the wheels, 14 inches in diameter, and 3 inches broad; *b*, the axle, to which is fastened an iron frame, *c*, movable on a pivot on the point of the iron bar, *f*, and in a socket at *e*; the bar *f* is one inch square, having a long ruff at *g*, which is turned and fitted to the eye, *e*, of the socket, fig. 8. The bar is bent so as to pass close under the cutter, and runs up to the pole. This bar is necessary to relieve the point of the upright spindle of the resistance opposed to the wheels in moving along. The cutter can be placed higher or lower on the spindle, so as to cut the straw to any height, by means of a series of holes through the spindle; pins passing through holes in the sockets of the arms, and the most suitable of the series. The cutter can also be screwed to any height from the ground, from two to eighteen inches, by means of an iron lever, on the point of which is a brass socket, in which the upright spindle runs, and on which it rests. The lever is hung by an iron chain passing over a pulley at *j*, and joining two iron rods at *k*, which connect it with a screw box, I, which is moved backwards and forwards, by turning round the screw, *m*. To the end of this screw is connected an iron rod, which runs along the upper side of the pole to a bearing at *h*. At the end of this rod is a winch, *o*, of 9 inches radius, by which the person who guides the machine can turn round the screw, and so raise or lower the cutter at pleasure. This is principally of use to raise the cutter when passing over a deep furrow, or in going from one field to another. P is a hollow piece of wood put upon the end of the rod, by which the man holds with one hand when guiding the machine. In most cases the cutters will cut ¼ of an acre without requiring to be sharpened, which can be done in two minutes by a common scythe-stone, two of which are conveniently carried in two leather pockets, *q*, fig. 2. When it is necessary to go with the machine to a distance, the upright spindle, with the drum and cutter, are taken from their place, and placed on the top of the carriage; and the small wheels are drawn close up to the cross bar. The draught bar, D, is taken from the end of the pole and placed near the frame

of the carriage. The horses are turned to draw from it, and can in this way travel any distance, and over any roads.

PLATE IX.

Threshing-Machine.

Threshing-machine worked by horses or water.

Fig. 1. *Plan of a Threshing-Machine*, to be driven by water, or by four horses occasionally when there is not a constant supply of water, with the new-invented apparatus for yoking horses.

A, the perpendicular axle (see A, fig. 2), in which are fixed the arms or levers D, that carry the great wheel B; and upon these arms are fixed the limbers, by which the cattle pull the machine when threshing. No. 1 and 2 represent two frames fixed in the axle A, and supported by the arms D; upon these frames are placed the two shifting-blocks, as 3 4 and 5 6, which have liberty to move or slide, either inwards to the axle or outwards from it. In each of these shifting-blocks are placed two running sheeves or whorles. F F, an endless chain or rope, which passes over the two sheeves that are placed in the shifting-blocks at the ends 4 and 5. By this chain the two blocks are so connected, that if the one is pulled outwards from the axle A, the other is pulled inwards alternately. 15 and 15 are two sheeves, by which the chain F F is kept clear of the axle A when turning round. Y Y are two ropes that pass over the sheeves which are placed in the shifting-blocks at their ends 3 and 6: upon each end of these ropes is fastened a small block, in which are placed the running sheeves 7, 8, 9, 10, and over these sheeves pass the double ropes, by which the horses pull when working this machine. *a*, *b*, *c*, *d*, *e*, *f*, and *g*, *h*, represent the limbers or ears, fixed by screw-bolts on the arms D D D D (see D D D in fig. 2), and in each of these ears are placed two running sheeves, by which the ropes are conveyed to the line of draught (see 1 and 2 in fig. 2); each horse is yoked to the ends of the chains or ropes, as at 11, 12, 13, and 14, these ropes passing over the sheeves 7, 8, 9, 10, which turn on their axis. By this means the draught will always press the collars equally upon the horses' shoulders; and though they are walking in a circle, yet the strains of the draught must press fairly or equally on their shoulders, without twisting their body to either side. This advantage cannot be obtained in the common way of yoking horses in a threshing-machine, unless the draught-chains on each side of the horse be made in exact proportion in length to the diameter of the circle in which he walks, or the chain next to the centre of the walk made a little shorter than the one farthest from it, which is often neglected; but in this way of yoking the horses the strain of the draught will naturally press equally on his shoulders when pulling, which of course must be less severe on the animal when walking in a circle.

Thus, the draught-chains, or ropes, being all connected by means of the endless chain F F, and the shifting blocks, with their sheeves, having liberty to move either inwards to the axle A, or recede from it, it is apparent, that if one of the horses relax, the other horse will immediately press the collar hard to his shoulders, and excite him to exertion. For instance, if the horse hooked to the draught-chains at 12 were to relax, then the one yoked at 14 would instantly take up his chain, and pull the collar close to his shoulders; so that the horse at 12 must either exert himself or be pulled backward. And, supposing the horses at 12 and 14 were both to relax, then the exertions of the horses at 11 and 13 would immediately pull the shifting block from 5 towards 3, and of course press the collars hard on the horses at 12 and 14, which would tend to drag them backward, and by this means push them to exertion. Thus, the horses being all connected by the draught-chains and shifting-blocks, their exertions are all united completely round the circle, so as to form one power applied to the machine, instead of as many independent powers as there are horses employed when yoked in the common way. It may sometimes be convenient to employ fewer horses than the whole number of which the machine admits. This is easily accomplished; for example, were the horse at 12 to be left out, then the two chains must be fastened or tied to the ears *c d*, and thus the horse at 12 is left out of the circle, whilst the horses at 11, 13, and 14, are nevertheless still united, so as to make one combined power act on the machine. This apparatus is the invention of Walter Samuel, an ingenious blacksmith at Niddry, in the county of Linlithgow. C C C C C C represent the pillars which support the large cross-beams V V V V, and roof of the course in which the horses walk when working this machine. B B represent the great wheel, fastened on the arms D D D D, that turns the pinion 16, which is fixed on one end of the horizontal axle E E, its other end having on it a toothed wheel near 21, that drives the pinion 18, placed upon the axle Q, on which axle is also fixed the wheel 19, to turn the pinion 20, which is fixed upon the gudgeon or pivot of the threshing-drum: by this means motion is conveyed from the great wheel to the drum. 21 represents a wheel fixed on the axle E, to drive the wheel 22, placed on the iron spindle S, on which spindle is fastened the wheel 23, to turn the wheel 24, placed upon the axle of the straw-shaker P; and on the pivot of the straw-shaker O is fixed the wheel 25, turned by the wheel 22; in this way, both straw-shakers are driven round when the machine is at work. 30 represents a small wheel fixed on the gudgeons of the axle Q, to drive the wheel 31, that turns the wheel 32, which wheel is fixed on the iron spindle R, having on its end at L a socket, that takes in a square on the gudgeon in one of the feeding-rollers, by which means they are turned round. These rollers are generally made of cast-metal, the circumference of the one being smooth, and of the other fluted, or having small teeth its whole length, in order to keep hold of the unthreshed corn; and as they revolve on their pivots, they feed the grain regularly forward, to receive the strokes from the threshers, by which the corn is detached from the straw. T T represent the axle on which is fixed the water-wheel 27; and upon the circumference of this wheel are placed the segments 28, to drive the wheel 29, which is fastened on the axle E E; by this means motion is conveyed from the water-wheel to the threshing part of the machine. M, the board or platform on which the unthreshed corn is spread, and introduced between the feeding-roller L L, which conveys it to the threshers. N, the threshing-drum; O, P, the two straw-shakers; and G G, H H, the frame that supports the feeding-rollers, threshing-drum, and straw-shakers. K K represent part of the barn walls or mill-house; U U, the joists of the floor on which the threshing part of the machine is placed. (See Q Q in Fig. 2.) X X are windows in the side wall to light the house.

Fig. 2. *Elevation of the same Machine.*—A A represent the perpendicular axle or shaft, in which are fixed the arms or levers D D D, that carry the great wheel, and by which the cattle draw when working in this machine. Upon these arms are also fixed the ears or hanging pieces, in each of which are placed two running sheeves, as 3, 4, 6, 9, 10; and over these sheeves pass the ropes or chains, having on their ends the eyes *e e e e e*, to which the collar chains of the cattle are hooked. E E

represent two frames, fixed on the axle A, and arms D D; upon these frames are placed the two shifting blocks F F. (See 3, 4, 5, 6, in fig. 1.) B B represent the great wheel, fastened upon the arms D D D (see B B, in fig. 1); this wheel turns the wheel 11, which is fixed upon the horizontal axle H; and on this axle is likewise fixed a wheel, to turn the wheel 13, placed on the axle K; on which axle is also fastened the wheel 14, to drive the pinion 15, which is fixed at P on the pivot of the threshing-drum. 16 represents a wheel fastened on the gudgeon of the axle K, to turn the intermediate wheel 17, that drives the wheel 18, which is fixed upon the iron spindle M, connected with the pivot in one of the feeding rollers, by which means the rollers are driven round. R, the threshing-drum; S, the straw-shakers; U, the searce, through which the grain and chaff pass down the hopper V, into the fanners, by which the one is separated from the other, the clean grain running down T, and the lighter sort at X, while the chaff is blown backward. W represents the fans, which are inclosed in a box of thin boards. (See V, in fig. 3.) There is a sheeve or whorle fastened on the gudgeon P of the threshing-drum R; from this sheeve passes the belt or band 14, over the sheeve 24, which is fixed upon the iron spindle Y, attached to the axle of the fans W; by this means the fans are driven with such velocity as to blow all the chaff and light refuse away from the grain. 19 represents the water-wheel, placed on the axle G G: upon the circumference of this wheel are fixed the toothed segments 20, that turn the wheel 21, which is fastened on the axle H; so that motion is by this means carried from the water-wheel to the threshing-drum; and when there is not a sufficient quantity of water, then the horses can be applied to drive the machine. In this case the frame or bearer that carries the wheel 19, must either be dropt a little down, so as its teeth may be clear of the wheel 21, or else one of the segments 20 taken off, to allow the wheel 21 to run freely. But when there is plenty of water for turning the machinery, then the wheel 11 must be raised up clear of the wheel B, which is easily done by turning round the screw-bolts 25, and raising the bearer 26 a little upwards, until the teeth of the wheel 11 be fully clear of the wheel B, so as it may revolve freely when the wheel 21 is turned, by the teeth of the segments 20 acting upon its teeth. Thus the threshing may be carried on without interruption, either with water or horses separately, or a small quantity of water may be applied to assist the horses at any time, when a sufficient supply of water cannot be obtained. O O, part of the barn-wall; P, the building that supports the frame, and one end of the axle which carries the water-wheel. Z Z Z Z represent the pillars that support the great beams and roof of the circle in which the horses walk when working the machine.

Fig. 3. *Section of the same Machine.*—A A represent the water-wheel; and B, cast-metal segments fixed on its circumference, having teeth to turn the wheel No. 2 (see 20 and 21, fig. 2); and upon the same axle is fixed the wheel No. 3, that drives the wheel No. 4, on the axle of which is fastened the wheel No. 5, that turns a pinion placed upon the axle of the threshing-drum. (See 14 and 15 in fig. 2.) C represents the board upon which the unthreshed corn is spread, and introduced between the feeding-rollers, to receive the strokes from the threshers or beaters, which are fixed upon the arms of the threshing-drum. G represents the two straw-shakers. (See O and P in fig. 1.) H H are two screw-bolts, that, when turned round the slider in which the pivots of the feeding-roller revolve, are moved either inward to the threshing-drum or outward from it, and of course can easily be placed at a greater or less distance from the beaters of the drum. K represents a cover of thin boards, which inclose the threshing-drum above and below; L M are the covers that inclose the straw-shakers above, and below the shakers are placed the searces O P R, that allow the grain and chaff to pass down through the hopper O R, into the fanners U V, by which they are separated; the clean corn running out at the opening X, and the chaff blown off at U, whilst the straw is thrown out at R by the shaker G. S T represent the frames, in which are placed cods or bushes of brass; and on these cods the pivots of the threshing-drum and straw-shakers revolve. T represents the course of the water, which, falling into the wheel a little before the centre, turns it round, and falls off near Z, where the float-boards begin to ascend. Thus, the wheel is turned round by the weight of the water in the buckets, on nearly one-half of its circumference; the ascending buckets, on the other half of the wheel, being quite empty, give very little resistance to its motion.

Threshing-machine worked by horses or wind.

View of a Threshing-Machine worked by horses or wind. Fig. 4.—Elevation of the tower, and machinery of the wind power for turning a threshing-machine; with a profile of the machinery, with barn or mill-house, and horse-course or shed, adjoining. A A represent the perpendicular axle that supports the arms or levers B B B B, to which the cattle are attached when working the machine. D D *d d* are ears, or hanging pieces of wood, fixed upon the arms B with screw-bolts. E represents a frame fixed upon these arms. On this frame are placed the shifting blocks F and I, each of them containing two running sheeves, over which passes the chain or rope G G, and connects the blocks together. In the shifting block I is placed a sheeve, over which passes the chain or rope that goes over the sheeves K K L L and M L L, placed in the ears *d d*. Likewise in the shifting-block F is placed a sheeve, and over it goes the chain or rope which passes on the sheeves M M and N N. By this means all the chains by which the cattle pull are directed to the line of draught. P P P P represent props or supports, to prevent the arms B, and the great wheel C C, from being pressed downwards by the strains to which they are exposed when the machine is threshing. Q is a bolster or block of wood, and into it is fixed a cod of brass, in which the lower or foot gudgeon of the axle A turns. R R R are pillars that support the large beams, and roof S S S, of the horse-course. C C represent the great wheel, fixed upon the arms B B B B; and on this wheel are fastened cast-metal segments, having teeth to drive the wheel No. 2, which is fixed on the horizontal axle T T; and upon this axle is also fastened the wheel No. 3, to turn the pinion No. 4, which is placed on the pivot of the threshing-drum: 5 and 6 are wheels that turn the feeding-rollers. U represents the threshing-drum, W the straw-shaker, and X the hopper that conveys the corn into the fanners No. 7, by which it is separated from the refuse, the clean grain running out at Y, the light or small at Z, whilst the chaff is blown backwards. No. 9, a sheeve fixed upon the axle of the threshing-drum; and over this sheeve goes a band or rope, that extends to the sheeve No. 10, which is fixed on the axle of the fanners; and by this means the fans are turned round with such velocity as to separate the chaff from the grain. No. 12 represents a wheel fastened on the threshing-drum axle, to turn the wheel No. 13, by which the straw-shakers are driven. 17 and 18 represent the side-walls of the barn, and 19 the roof.

A A represent the arms of the vans, and X X the frames in which the pivots of the cylinders turn when the sails are either spread out or rolled up; B the shaft or axle on which the arms of the vans are fixed; and upon this axle is also fastened the wheel No. 1, to turn the wheel No. 2, which is fixed on the perpendicular axle C; and upon this axle is likewise placed the wheel No. 3, to turn the wheel No. 4, which is fixed on the axle D D, having upon its gudgeon at E a coupling or shifting-box, that connects it with the pivot of the threshing-drum when the machine is driven by the wind; and by the box having liberty to shift, the one axle can easily be detached from the other when the horse-power is to be applied. No. 5 represents a sheeve or whorle, placed on the axle C; and over this sheeve goes the rope or band Y, that passes over the sheeve No. 6, which is fixed upon the iron spindle Z: by this means the balls in the frame are driven round. This frame, having movable joints at F F F, has liberty to yield; so that when the wind is very strong, the vans of course must move with too great velocity, and be apt to break some part of the machine. But by this quick motion the balls are thrown outwards from the spindle Z, by which the teethed rod G is pulled downwards, and turns the wheel No. 8, upon the axle of which is fixed a pinion, that drives the wheel No. 9; and upon its axle is fixed the pinion No. 10. This pinion acts on the teeth of an iron rod, that goes through a hole in the centre of the axle B, to N; this rod having teeth also at M, which act on the teeth of the segments P P M, that have liberty to move on their pivots at K, so that when the rod M is pushed by the pinion either outward or inward, the segments P P M are likewise moved forwards or backwards; and as one end of the iron rods P P is hooked to these segments, and their other ends attached to the frames X X, by this means the frames are moved either inward to the axle B or outwards from it; and as the pivots of the cylinders on which the sails are rolled turn in these frames, of course they are either rolled on or off, according to the strength of the wind or velocity of the vans. H H represent a small van, which turns the large ones to face the wind. No. 11 is a pinion, fixed on the axle of the small vans, to drive the wheel No. 12, which is placed upon one end of an iron spindle, having on its other end the pinion No. 13, to turn the wheel No. 14, fixed on an axle, upon which is also placed a pinion at 15, that acts on the teeth of the segments, which are fixed on the dead frame 16 and 16, which is placed on the top of the tower. Q Q, the moving frame that carries the vans and wheels; R represents friction-rollers, on which the neck of the wind-shaft revolves; S S, walls of the tower; T, a door; U U U U, windows to light the tower; V, the upper floor; W, the middle floor, and bearer, in which the lower gudgeon of the axle C turns when the machine is at work.

Fig. 5. *Section of the threshing part of the Machine.*—A represents the board upon which the unthreshed grain is spread, and introduced between the feeding-rollers B; C C represent one end of the drum, with the threshers or beaters D D D D fixed upon the extremity of its arms; E E E E the shaker that receives the straw from the threshing-drum, and conveys it to the shaker F F F F, by which it is thrown down the sloping searce Z, either on the low floor or upon a sparred rack, which moves on rollers turned by the machine, and by this means is conveyed into the straw-shed, or else into the barn-yard. The searce L is placed below the threshing-drum, while its circular motion throws out the straw at an opening G, into the straw-shaker E, which conveys it to the shaker F; at the same time the chaff and grain pass down through a searce or sparred rack, P, into the hopper Q, which conveys it into the fanners R S, by which the corn is separated from the chaff, the clean grain running out at the opening V, and the chaff or any light refuse blown out at R by the rapid motion of the fans, which are driven by a band or rope, T U, from a sheeve placed upon the axle of the threshing-drum, and passing over the sheeve 7, fixed upon the pivot of the fans. (See 9 and 10 in fig. 4.) X X is part of the side-wall of the barn or mill-house; Y Y, the loft or floor whereon the frame is placed; and in this frame are fixed cods or bushes of brass, in which the pivots of the threshing-drum and straw-shaker revolve; 8 and 8 are doors in the side-wall of the barn; 9 and 9 are windows in the side-wall, to light the house.

Figs. 6 and 7. *The Odometer.*

The wheel A is made of light iron, and measures two yards in circumference, being divided by six spokes into feet. One spoke must be painted white.

The handle B is divided at C like a fork, and embraces each end of the axis by its elasticity. Through the axis is a hole, into which the end H of the way-wiser fits, and is held fast by a nut D.

The way-wiser consists of a frame F G, F being hollow to receive a perpetual screw H, a part of which is visible near the index M. At the other end of the screw is a nut I, which keeps it in its place. The screw turns two brass concentric cogged wheels K and L; K conceals the scale of L, except where a piece is cut out, leaving an index at the beginning of the scale of K, and which, in the drawing, points to 78 of L.

The scale of K is numbered towards the left, and that of L to the right.

The wheel K has 100 cogs or teeth, and L 101; consequently, as the same endless screw turns both wheels, it is evident that when K has made a complete revolution of 100 teeth, L will also have made a revolution of 100 teeth; and the index of K will point to 1 of L, because L has 101 teeth. After a second revolution, it will point to 2, and so on; the number it points to marking the number of revolutions, each revolution showing 100 turns of the iron wheel A.

Accordingly, A measures six feet, or 1 turn; K 100 times 6 feet, or 600 feet, or 1 revolution; and L 101 times 600 feet, or 60,600 feet, equal to nearly 11½ English miles, the range of the instrument.

880 turns of this wheel make a mile.

It is advisable always to commence with the way-wiser set at 0 or zero. To do this, take out the screw in the centre, when the brass wheels K and L can both be set at zero, and the screw replaced. Set the wheel A upon the ground, with the white spoke undermost, and fix the way-wiser into the wheel by means of the nut D, always observing to put it on the left side, as shown in the plate at E.

At any period of measuring, you can tell exactly how far you have gone, and proceed without again setting the way-wiser at 0.

Suppose, as in the drawing, the spoke No. 2 at the ground, the index M pointing at 26 of K, and the index of K pointing at 78 of L; then the distance measured is 7826 turns of A and two feet; and as A measures two yards, 7826 × 2 = 15652 yards, to which add the two feet.

In reading off, particular care should be taken always to read the large figures (viz. those on the wheel L) first, and afterwards to add the small figures (viz. those on the wheel K); and if the figures on K amount to less than 10, a 0 must be prefixed, so that K shall always show two figures: for instance, L being at 46, and K at 4, the sum is 4604. The easiest way to guard against error, is to read 46 and add the word hundred; thus, forty-six hundred and four, and not four thousand six hundred and four.

The Dynamometer.

Fig. 8.—Veitch's *Dynamometer*. A B represent the two ends of the spring to which the plough and horses are yoked, C is a small bar with one of its ends turning tight on a round axis D, and the other end E pushes round the index F, which points out the number of stones (of 14 lbs.) on the index plate G.

PLATE X.

Bone-mill.

Fig. 1 and 2 are two elevations of a *Bone-mill*, the first being taken in front, to show the water-wheel and the length of the rollers, and fig. 2 at the end, to show the bones passing through the rollers. The water-wheel, A A, is represented as being of the over-shot kind; it is included between the two walls, B B, upon the top of which, the pivots or gudgeons of its axis are supported in brass bearings. A square formed on the end of one of the gudgeons is received into a square socket at the end of the connecting axis, D, which communicates the motion to the lowest, F, of the two rollers, the latter having a similar square on the end of its axis, to be received into the socket at the end of the connecting axis, D. The rollers are supported by a wooden frame, G G. Two iron frames, H H, are bolted down upon it, having grooves or openings in them, of nearly the whole length, to receive the brasses for the pivots of the rollers, as shown in fig. 2. At the upper ends of these grooves are screws, *h h*, by which the rollers can be made to act at a greater or less distance from each other, as the size of the bones which are to pass through them may require. Two pinions, *k l*, are placed upon the ends of the axles of the two rollers, and by their teeth acting together, they compel the two rollers to accompany each other. The surfaces of the rollers are filled with indentations and strong teeth, which penetrate and break the bones to pieces. This is accomplished by employing separate cast-iron wheels, placed side by side upon an axis, to compose the rollers; the wheels have coarse teeth, similar to those of a saw or ratchet-wheel; each wheel of the lower roller, F, is an inch thick, and they are placed at distances of an inch and a half asunder, having circles of hard wood or iron placed between them, which are two inches less in diameter. Thus they leave grooves between the toothed wheels, which have the effect of rendering the teeth upon the surface of the roller insulated. The wheels of the opposite roller, E, are 1½ inch wide, and the spaces between them only 1 inch; and the two are so situated with respect to each other, that the teeth upon one are opposite to the spaces between the teeth of the other, as is clearly explained by the figure. A hopper, I I, is fixed above the machine, over the rollers, and into this the bones are filled, so that they rest upon the two rollers, and are drawn in by their motion, the teeth penetrating and breaking every piece, however large or solid it may be. The bones should be supplied rather gradually to the machine at first, to avoid choking it, and the rollers should then be adjusted to a considerable distance asunder; but when the bones have once passed through in this way, the rollers are screwed closer by the screws, *h h*, and the fragments ground a second time. This will generally be found sufficient, as it is not advisable to reduce the bones to a state of extreme division. The pinions must have deep cogs, to enable them to take deep hold of each other, when the rollers are set at only half an inch distance to grind fine, and without the cogs being liable to slip when the centres are separated, so far as to leave a space of 1 inch, or 1½ inch, between the rollers, for the passage of the large bones the first time. The rollers will act most effectually if the different wheels are fixed upon their axles in such a position that the teeth will not correspond, or form lines parallel to the axes, and then no piece of bone can escape without being broken by some of the teeth. The bones which have passed through the rollers slide down the inclined board, R, and collect at the bottom in a large heap. When all the stock of bones is thus coarsely broken, a labourer takes them up in a shovel, and throws them again to the hopper, to be ground a second time.

Machine for grinding potato-flour.

Fig. 3. *A Machine for grinding Potato-flour.*—A, a cylinder covered with tin-plates, pierced with holes, so as to leave a rough surface, in the same manner as the graters used for nutmegs, &c. but the holes in this are larger. This cylinder is situate beneath a hopper, B, into which the potatoes are thrown, and thence admitted into a kind of trough, C, where they are forced against the cylinder, which, as it revolves, grinds the potatoes to a pulp. Motion is given to the machine by a handle fixed upon the end of the axis of the grating cylinder, A; and on the opposite extremity of this axis is a fly-wheel, D, to regulate and equalize the movement. The potatoes, when put into the hopper, press by their weight upon the top of the cylinder; and, as it revolves, they are in part grated away. On one side of the lower part of the hopper is an opening, closed or opened, more or less at pleasure, by a slider, *d*; and the degree of opening which this has regulates the passage of the potatoes from the hopper into the trough, C. This is as wide as the length of the cylinder, and has a concave board, R, fitted into it, which slides backwards and forwards by the action of levers, *a*, fixed to an axis extended across the frame of the machine; and a lever, N, is fixed upon this axis, and carries a weight which acts upon the board, R, by means of the levers, to force or press forwards the potatoes contained in the trough C against the cylinder, and complete the grating of them into a pulp. The tin-plate covering the cylinder is of course pierced from the inside outwards, and the bur or rough edge left round each hole forms an excellent rasping surface.

Potato-scoop.

Fig. 4. *A Potato-Scoop.*—A, the end of the handle, having a round stem, which passes through a piece of metal, D, and has then a semicircular knife or cutter, E, fixed to it. This is sharp on both edges, and turns upon a pivot, fitted in a similar piece of brass to D, which, as well as the latter, is formed out of a piece of plate, B C. This forms a shield to hold the instrument firm upon the potato, by placing the thumb of the left hand upon the shield, B C, and pressing the points of D into the root, which is grasped in the hand; then, by turning the handle half round with the right hand, the semicircular knife makes a sweep, and cuts out a piece or set, which is a segment of a small sphere. Fig. 5 is an end view of the shield, B C, and the knife, E, also the piece of brass, D, placed upon the surface of a potato, F, in which the dotted line F G shows the piece the knife will cut out by its motion. The only attention necessary in the use of this tool is, that it be placed upon the potato, with the eye or part from whence the shoot springs in the centre of the semicircle of the knife, when it is laid flat upon the root. The advantage of this scoop, besides that it is very quick in its operation, is, that the pieces, being all of one exact size, which is about one inch diameter, they can be planted, by a bean-barrow or drill-machine, with much less labour and more accuracy than by the hand.

Machine for levelling land.

Fig. 6. *A Machine for levelling Land.*—D, a pole to which the horses or oxen are harnessed, jointed to the axle-tree, E, of a pair of low wheels, A A. Into this axle-tree are mortised two long side-pieces, G G, terminating in handles, B B. Somewhat inclined to these long or upper side-pieces, shorter lower ones, H H, are jointed by cross pieces,

and connected by strong side-boards. The machine has no bottom; its back part, F, is strongly attached to an axle C; to the bottom of this back-board, the back or scraper part, *d*, of a strong iron frame, *a*, *a*, is firmly screwed, as shown in fig. 7, and the front ends of the slide-iron, *b b*, turning up, pass easily through mortises in the upper side-pieces, G, where, by means of pins, the inclination of the slide-irons and of the back-board can be adjusted within narrow limits, according to the nature of the soil to be levelled, and the mass of earth previously loosened by ploughing, which the back-board is intended to collect and force before it, until the machine arrives at the place where it is intended to be deposited. Here, by lifting up the hinder part of the machine by means of its handles, the contents are left on the ground, and the machine proceeds to a fresh hillock.

Farm-house.

Plate XI. The names of the different figures, and of the divisions of fig. 5, being marked on the engraving itself, no further explanation can be necessary.

Plates XII. XIII. XIV. XV. XVI. XVII. are sufficiently explained in the chapter on LIVE STOCK, from which the necessary references are made to these plates.

AGRIGAN, or Island of St Francis Xavier, one of the Ladrone or Marianne Islands. It is 50 miles in circumference, is very mountainous, and has a volcano in it; situated in long. 146. E. lat. 19. 4. N.

AGRIGENTUM, in *Ancient Geography*, a city of Sicily, part of the site of which is now occupied by a town called *Girgenti*, from the old name. See GIRGENTI. According to ancient authors, Dædalus, the most famous mechanician of fabulous antiquity, fled to this spot for protection against Minos, and built many wonderful edifices for Cocalus, king of the island. Long after his flight, the people of Gela sent a colony hither 600 years before the birth of Christ, and, from the name of a neighbouring stream, called the new city *Acragas*, whence the Romans formed the word *Agrigentum*. These Greeks converted the ancient abode of the Siculi into a citadel to guard the magnificent city which they erected on the hillocks below. An advantageous situation, a free government with all its happy effects, and an active commercial spirit, exalted their commonwealth to a degree of riches and power unknown to the other Greek settlements, Syracuse alone excepted. But the prosperity of Agrigentum appears to have been but of short duration, and tyranny soon destroyed its liberties. Phalaris was the first who reduced it to slavery. His name is familiar to most readers on account of his cruelty, and the brazen bull in which he tortured his enemies. See PHALARIS. Phalaris met with the common fate of tyrants, and after his death the Agrigentines enjoyed their liberty for 150 years; at the expiration of which term Thero usurped the sovereign authority. The moderation, justice, and valour of this prince preserved him from opposition while living, and have rescued his memory from the obloquy of posterity. He joined his son-in-law Gelo, king of Syracuse, in a war against the Carthaginians; in the course of which victory attended all his steps, and Sicily saw herself for a time delivered from her African oppressors. Soon after his decease, his son Thrasydeus was deprived of the diadem, and Agrigentum restored to her old democratical government. Ducetius next disturbed the general tranquillity. He was a chief of the mountaineers, descendants of the Siculi; and was an overmatch for the Agrigentines while they were unsupported by alliances, but sunk under the weight of their union with the Syracusans. Some trifling altercations dissolved this union, and produced a war, in which the Agrigentines were worsted, and compelled to submit to humiliating terms of peace. Resentment led them to embrace with joy the proposals of the Athenians, then meditating an attack upon Syracuse. Their new friends soon made them feel that the sacrifice of liberty and fortune would be the price of their protection, and this consideration brought them speedily back to their old connections. But, as if it had been decreed that all friendship should be fatal to their repose, the reconciliation and its effects drew upon them the anger of the Carthaginians. By this enemy their armies were routed, their city taken, their race almost extirpated, and scarce a vestige of magnificence was left. Agrigentum lay 50 years buried under its own ruins, when Timoleon, after triumphing over the Carthaginians, and restoring liberty to Sicily, collected the descendants of the Agrigentines, and sent them to re-establish the dwellings of their forefathers. Their exertions were rewarded with astonishing success; for Agrigentum rose from its ashes with such a renewal of vigour, that in a very short time we find it engaged in the bold scheme of seizing a lucky moment, when Agathocles and Carthage had reduced Syracuse to the lowest ebb, and arrogating to itself supremacy over all the Sicilian republics. Xenodicus was appointed the leader of this arduous enterprise; and had his latter operations been as fortunate as his first campaign, Agrigentum would have acquired such a preponderance of reputation and power, that the rival states would not have even dared to attack it. But a few brilliant exploits were succeeded by a severe overthrow; the Agrigentines lost courage, disagreed in council, and humbly sued for peace to Agathocles. This commonwealth afterwards took a strong part with Pyrrhus, and, when he left Sicily to the mercy of her enemies, threw herself into the arms of Carthage. During the first Punic war Agrigentum was the headquarters of the Carthaginians, and was besieged by the Roman consuls, who, after eight months' blockade, took it by storm. It nevertheless changed masters several times during the contest between these rival states, and in every instance suffered most cruel outrages. After this period very little mention of it occurs in history, nor do we know the precise time of the destruction of the old city and the building of the new one. See GIRGENTI.

The hospitality and parade for which the Agrigentines are celebrated in history were supported by an extensive commerce; by means of which, the commonwealth was able to resist many shocks of adversity, and always to rise again with fresh splendour. It was, however, crushed by the general fall of Grecian liberty; the feeble remnants of its population, which had survived so many calamities, were at length driven out of its walls by the Saracens, and obliged to lock themselves up for safety among the bleak and inaccessible rocks of the present city.

The principal part of the ancient city lay in the vale; the present town, called *Girgenti*, occupies the mountain on which the citadel of Cocalus stood. The whole space comprehended within the walls of the ancient city abounds with traces of antiquity, foundations, brick arches, and little channels for the conveyance of water; but in no part are any ruins that can be presumed to have belonged to places of public entertainment. This is the more extraordinary, as the Agrigentines were a sensual people, fond of shows and dramatic performances, and the Romans never dwelt in any place long without introducing their savage games. Theatres and amphitheatres seem better calculated than most buildings to resist the outrages of time; and it is surprising that not even the vestiges of their form should remain on the ground.

AGRIONIA, in *Grecian Antiquity*, festivals annually celebrated by the Bœotians in honour of Bacchus. At these festivals the women pretended to search after Bacchus as a fugitive, and, after some time, gave over their inquiry, saying that he had fled to the Muses, and was concealed among them.

AGRIOPHAGI, in *Antiquity*, a name given to those who fed on wild beasts. The word is Greek, being compounded of *αγριος, wild, savage,* and *φαγω, I eat.* The name is given, by ancient writers, to certain people, real or fabulous, said to have fed altogether on lions or panthers. Pliny and Solinus speak of *Agriophagi* in Ethiopia, and Ptolemy of others in India on this side the Ganges.

AGRIPPA, Cornelius, born at Cologne in 1486, a man of considerable learning, and by common report a great magician: for the monks at that time suspected every thing of heresy or sorcery which they did not understand. He composed his treatise of the *Excellence of Women* to insinuate himself into the favour of Margaret of Austria, governess of the Low Countries. He accepted of the charge of historiographer to the emperor, which that princess gave him. The treatise of the *Vanity of the Sciences*, which he published in 1530, enraged his enemies extremely; as did that of *Occult Philosophy*, which he printed soon after at Antwerp. He was imprisoned in France for something he had written against Francis I.'s mother; but was liberated, and went to Grenoble, where he died in 1534.

Agrippa, *Herod*, the son of Aristobulus and Mariamne, and grandson to Herod the Great, was born in the year of the world 3997, three years before the birth of our Saviour, and seven years before the vulgar era. After the death of Aristobulus his father, Josephus informs us that Herod his grandfather took care of his education, and sent him to Rome to make his court to Tiberius. The emperor conceived a great affection for Agrippa, and placed him near his son Drusus. Agrippa very soon won the graces of Drusus, and of the empress Antonia. But Drusus dying suddenly, all those who had been much about him were commanded by Tiberius to withdraw from Rome, lest the sight and presence of them should renew his affliction. Agrippa, who had indulged his inclination to liberality, was obliged to leave Rome, overwhelmed with debt, and in a very poor condition. He did not think it fit to go to Jerusalem, because he was not able to make a figure there suitable to his birth. He retired therefore to the castle of Massada, where he lived rather like a private person than a prince. Herod the tetrarch, his uncle, who had married Herodias, his sister, assisted him for some time with great generosity. He made him principal magistrate of Tiberias, and presented him with a large sum of money; but all this was not sufficient to answer the excessive expenses and profusion of Agrippa; so that Herod growing weary of assisting him, and reproaching him with his bad economy, Agrippa took a resolution to quit Judea, and return to Rome. Upon his arrival he was received into the good graces of Tiberius, and commanded to attend Tiberius Nero, the son of Drusus. Agrippa, however, having more inclination for Caius, the son of Germanicus, and grandson of Antonia, chose rather to attach himself to him; as if he had some prophetic views of the future elevation of Caius, who at that time was beloved by all the world. The great assiduity and agreeable behaviour of Agrippa so far engaged this prince, that he kept him continually about him.

Agrippa being one day overheard by Eutyches, a slave whom he had made free, to express his wishes for Tiberius's death and the advancement of Caius, the slave betrayed him to the emperor; whereupon Agrippa was loaded with fetters, and committed to the custody of an officer. Tiberius soon after dying, and Caius Caligula succeeding him, the new emperor heaped many favours and much wealth upon Agrippa, changed his iron fetters into a chain of gold, set a royal diadem upon his head, and gave him the tetrarchy which Philip the son of Herod the Great had been possessed of, that is, Batanæa and Trachonitis. To this he added that of Lysanias; and Agrippa returned very soon into Judea to take possession of his new kingdom.

Caius being soon after killed, Agrippa, who was then at Rome, contributed much by his advice to maintain Claudius in possession of the imperial dignity, to which he had been advanced by the army. But in this affair Agrippa acted a part wherein he showed more cunning and address than sincerity and honesty; for while he made a show of being in the interest of the senate, he secretly advised Claudius to be resolute, and not to abandon his good fortune. The emperor, as an acknowledgement for his kind offices, gave him all Judea and the kingdom of Chalcis, which had been possessed by his brother Herod. Thus Agrippa became of a sudden one of the greatest princes of the East, and was possessed of as much, if not more territories than had been held by Herod the Great, his grandfather. He returned to Judea, and governed it to the great satisfaction of the Jews. But the desire of pleasing them, and a mistaken zeal for their religion, induced him to commit an unjust action, the memory of which is preserved in Scripture, Acts xii. 1, 2, &c.; for about the feast of the passover, in the year of Jesus Christ 44, St James major, the son of Zebedee and brother of St John the Evangelist, was seized by his order and put to death. He proceeded also to lay hands on St Peter, and imprisoned him, waiting till the festival was over, that he might then have him executed. But God having miraculously delivered St Peter from the place of his confinement, the designs of Agrippa were frustrated. After the passover this prince went from Jerusalem to Cæsarea, and there had games performed in honour of Claudius. Here the inhabitants of Tyre and Sidon waited on him to sue for peace. Agrippa being come early in the morning to the theatre, with a design to give them audience, seated himself on his throne, dressed in a robe of silver tissue, worked in the most admirable manner. The rising sun darted on it with its rays, and gave it such a lustre as the eyes of the spectators could not endure. When, therefore, the king spoke to the Tyrians and Sidonians, the parasites around him began to say that it was the voice of a god, and not that of a man. Instead of rejecting these impious flatteries, Agrippa received them with an air of complacency; but at the same time observed an owl above him on a cord. He had seen the same bird before, when he was in bonds by order of Tiberius; and it was then told him that he should be soon set at liberty, but that whenever he saw the same thing a second time, he should not live above five days afterwards. He was therefore extremely terrified; and he died at the end of five days, racked with tormenting pains in his bowels, and devoured with worms. Such was the death of Herod Agrippa, after a reign of seven years, in the year of Christ 44.

Agrippa II. son of the preceding Herod, was made king of Chalcis; but three or four years after, he was deprived of that kingdom by Claudius, who gave him in the place of it other provinces. In the war which Vespasian carried on against the Jews, Herod sent him a succour of 2000 men; by which it appears, that though a Jew by religion, he was yet entirely devoted to the Romans, whose assistance indeed he wanted to secure the peace of his own kingdom. He lived to the third year of Trajan, and died at Rome A. C. 100. He was the seventh and last king of the family of Herod the Great. It was before him and Berenice his sister that St Paul pleaded his cause at Cæsarea.

AGRIPPA, *Marcus Vipsanius*, son-in-law to Augustus, of mean birth, but one of the most considerable generals among the Romans. Augustus's victory over Pompey and Mark Antony was owing to his counsel. He adorned the city with the Pantheon, baths, aqueducts, &c.

AGRIPPINA, daughter of Germanicus, sister of Caligula, and mother of Nero; a woman of wit, but excessively lewd. She was thrice married, the last time to Claudius, her own uncle, whom she poisoned to make way for Nero, her son. Nero afterwards caused her to be murdered in her chamber, when she bid the executioner stab her first in the belly, that had brought forth such a monster.

AGRIPPINA COLONIA UBIORUM, in *Ancient Geography*, now *Cologne;* so called from Agrippina, the daughter of Germanicus and mother of Nero, who had a colony sent thither at her request by the emperor Claudius, to honour the place of her birth. See COLOGNE.

AGRIPPINIANS, in *Church History*, the followers of Agrippinus, bishop of Carthage in the third century, who first introduced and defended the practice of re-baptisation.

AGROM, a disease frequent in the East Indies, in which the tongue is parched, chaps, and is sometimes covered with white spots. The Indians attribute this disease to extreme heat of the stomach.

AGROSTOGRAPHIA signifies the history or description of grasses.

AGROUND, the situation of a ship whose bottom, or any part of it, hangs or rests upon the ground, so as to render her immovable till a greater quantity of water floats her off, or till she is drawn out into the stream by the application of mechanical powers.

AGRYPNIA, among *Physicians*, implies an inaptitude to sleep; a troublesome symptom of feverish and other disorders.

AGRYPNIA, in the *Greek Church*, implies the vigil of any of the greater festivals.

AGUADA, a Spanish river in Salamanca. It rises in the Sierra de Xalama, and empties itself, near San Martino, into the Duero. It is 83 miles in length.

AGUAS-BELLAS, a town of Portugal, where a free mart is held, in the district of Thomar, and province of Estremadura.

AGUDA, a river in the province of Burgos, in Spain, which discharges its water into the Ebro.

AGUE, a general name for all periodical fevers, which, according to the different times of the returns of the feverish paroxysm, are denominated tertian, quartan, and quotidian.

Ague-Cake, the popular name for a hard tumour on the left side of the belly, lower than the false ribs, said to be the effect of intermittent fevers.

AGUESSEAU, HENRY FRANCIS D', Chancellor of France, illustrious for his virtues, learning, and talents, was born at Limoges on the 27th of November 1668. His father, at that time intendant of Languedoc, and afterwards a counsellor of state, was a man of great worth and abilities. He seems to have taken the sole charge of his son's education; and having destined him for the bar, he took uncommon pains to exercise him in every branch of knowledge which could contribute to his success in that profession. His care was rewarded with the happiest success. Young D'Aguessean gave early indications of uncommon abilities; and such was his thirst for knowledge, and his habits of application, that he soon acquired the reputation of an almost universal scholar. He had a particular relish for poetry, which, he used to say, "was the only passion of his youth;" but this passion was so far from withdrawing him from severer studies, that it was allied in his mind with a nearly equal taste for mathematics. He studied law with the zeal of an antiquary, and the spirit of a philosopher; and, in order to form his taste as a pleader, he employed a whole year in repeated perusals of the most esteemed productions of ancient eloquence. After this thorough course of preparation, he became an advocate in 1690; and, by the interest of his father, who then resided in Paris, he was soon furnished with opportunities of distinguishing himself, and of rising to the highest honours of the profession. When little more than 21 years of age, he was appointed one of the three *Advocates-General*,—an office which imposed the duty of assisting in those causes where the king, the church, or the public was concerned. The king, Louis XIV., in appointing him, yet untried, to this situation, acted solely upon the recommendation of the elder D'Aguesseau, "who was incapable," said Louis, "of deceiving him, even to advance his own son." D'Aguesseau's first appearances as an advocate-general were such as amply to fulfil the expectations of his father, and to warrant the appointment which he had obtained from the king. Denis Talon, an old lawyer who had long officiated with great reputation in the same capacity, was heard to say, that "he should have been glad to have finished his career as that young man had begun."

D'Aguesseau held this office for ten years, during which period he greatly distinguished himself, both for learning in his profession, and for a superior style of forensic eloquence. He was, indeed, one of the first reformers of the language of the French bar, which had not yet taken much polish from the national improvements in taste and literature. His diction, both in his pleadings and in his juridical compositions, was that of a mind expanded by a liberal course of study, and refined by a familiar acquaintance with classical models. The society which he chiefly frequented was also well adapted to improve his taste; for the chosen companions of his leisure hours were Racine and Boileau, the latter of whom has frequently mentioned him with praise in his writings.

It was D'Aguesseau's opinion, that no one could rise to distinguished eminence as an orator, who did not labour to enlarge his mind, and to improve his taste, by the study of philosophy and by exercises of literature; and he accordingly employed several of those stated Discourses, which the usages of France required from the advocates-general at the opening of the Sessions, to impress these views upon the minds of the younger members of the bar. Such, in particular, was the object of the Discourse, pronounced in 1695, *Sur l'Union de la Philosophie et de l'Eloquence*. The same subject is resumed at greater length, and in a more systematic manner, in a treatise, written at a later period, under the title of *Instructions sur l'Etude et les Exercises qui peuvent préparer aux Fonctions d'Avocat du Roi.* These Pieces (*Œuvres*, tom. i.) are written in a clear, manly, and harmonious style, and are well worthy the attention of the general scholar, for their critical strictures on those authors whom he recommends to the students of law.

In the year 1700 he was appointed *Procurator-General;*

an office of higher dignity, and of more various and extensive duties, than that of advocate-general. He filled this office for seventeen years with the most splendid reputation; adding, by his lenity in criminal cases, and by his care of the public hospitals, the praise of humanity and benevolence to his other claims to the respect and admiration of his countrymen. The political philosopher of the present day will probably, however, be inclined to question the justness of the encomiums bestowed upon his exertions during the severe scarcity of 1709; on which occasion he appears to have instituted the most rigorous proceedings against those who were held up as enemies of their country and of mankind, under the names of forestallers and monopolists. But, in alluding to this part of his conduct, it may be proper to mention, that his opposition, at an after-period, to the delusive projects of the famous John Law, and his elaborate treatise upon the subject of *Money* (*Œuvres*, tom. x.), afford undeniable proofs of the soundness of his views in regard to some of the most important doctrines of political economy.

It had been early predicted of D'Aguesseau, that he would one day fill the place of Chancellor; and this prediction was at length realized in 1717, upon the death of Voisin, who then held the seals. Though he was yet only forty-eight years of age, his nomination to this high dignity gave general satisfaction, and was, indeed, intended as a popular measure by the duke of Orleans, who had lately assumed the regency. His brother Valjouan, a man of abilities, but slothful and a humourist, was the only person who refused to congratulate him on the occasion. "Rather you than I, brother," was his remark when the new chancellor hastened to him to announce his appointment. In fact, D'Aguesseau soon began to experience the difficulties and perils attendant upon his elevation; for he had not been installed above a year, when he was deprived of the seals, and exiled to his estate. His steady opposition to the extravagant projects of Law, with which the regent and his ministers were wholly intoxicated, was the honourable cause of this first reverse of fortune. In 1720, when the ruinous consequences of these schemes had filled the nation with distress and alarm, the chancellor was recalled from banishment; and he contributed not a little, by the firmness and sagacity of his counsels, to calm the public discontents, and repair the mischiefs which had been committed.

Law himself had acted as the messenger of his recall; and it is said that D'Aguesseau's consent to re-accept the seals from the hand of this adventurer was much blamed by the literary corps, with which he had hitherto stood in high favour, as well as by the parliament. But his reputation appears to have sustained a much severer shock, when he endeavoured to prevail with the latter body to register the declaration of the late king in favour of the bull *Unigenitus*,—a measure which they held in great abhorrence, and which he had himself firmly opposed during the life of Louis. The regent's favourite, Dubois, then archbishop of Cambray, had moved his master to insist upon this act of registration, in the hope that he might thereby obtain a cardinal's hat; and it seems to have been thought that the chancellor had yielded his better opinion in compliance with the wishes of this worthless minion. Be this as it may, it is certain that he opposed the favourite with firmness, when he attempted, after being made prime minister, to take precedence in the council; and he was in consequence, in 1722, sent a second time into exile.

He now passed five years on his estate at Fresnes; and he always spoke with delight of this tranquil period, when he was left free from the cares of professional duty, and the distractions of public life, to cultivate his mind. The Scriptures, which he read and compared in various languages, and the Jurisprudence of his own and other countries, formed the subjects of his more serious studies: the rest of his time was devoted to philosophy and literature, and the improvement of his park, where he was sometimes to be seen employed with a spade.

From these noble and congenial occupations he was again recalled, by the advice of Cardinal Fleury, in 1727; but the seals were not restored to him till ten years thereafter. During the intervening period he had endeavoured to mediate in the new disputes which had arisen between the court and the parliament; but his interference seems to have given satisfaction to neither party,—the one reproaching him with desertion from their cause, and the other with too great a leaning towards it. When the seals were at last restored to him, he completely withdrew from all affairs of state, and devoted himself entirely to his duties as chancellor, and to the introduction of those reforms which had long occupied his inquiries and meditations.

Besides some important enactments regarding Donations, Testaments, and Successions, he introduced various regulations for improving the forms of procedure, for ascertaining the limits of Jurisdictions, and for effecting a greater uniformity in the execution of the laws throughout the several provinces. These reforms constitute an epoch in the history of the jurisprudence of France, and have associated his name with those illustrious benefactors of her Civil Code, L'Hôpital and Lamoignon. The duke de Saint-Simon, however, alleges that the chancellor's reforms did not go so far as they would have gone had he had less affection for his own order. He once, says this writer, confessed to a nobleman who spoke to him as to the propriety of cutting off certain lucrative abuses, that he could not bring his mind to a step which would so grievously diminish the profits of the law.

In 1750, when upwards of eighty-two years of age, he besought the king to accept his resignation; and he was accordingly permitted to retire, the king continuing to him the honours of his office as a special mark of his approbation. He died in the following year, and was interred, according to his own request, in the common burial-place of the village of Auteuil, where the remains of his wife, who died there in 1735, had been deposited. The name of this lady, whom he married in 1694, and by whom he had several children, was Anne Lefèvre d'Ormesson.

This great man has not, in all respects, been equally praised by those who have attempted to transmit his character to posterity. Saint-Simon and others reproach him with a degree of tardiness and indecision, which sometimes greatly obstructed the course of justice. His own answer to this charge has been recorded by Duclos, and is worthy of notice: "When I recollect," said he, "that a decision of the chancellor makes a law, I think myself warranted in taking a long time for consideration." Saint-Simon and D'Argenson also impute to him some defects as a practical statesman; but his elevation of mind and extensive knowledge, his piety, probity, and disinterestedness, have been universally admitted and extolled. In his magisterial capacity he was grave and dignified, without any approach to haughtiness; in private society his manners were mild, equal, and even playful. He was particularly remarkable for the tenaciousness of his memory, and for the facility with which he could direct his attention to the most diversified exercises of the intellectual powers. At eighty years of age he has been heard to repeat whole poems which he had never perused since the days of his early youth; and, when fatigued with professional duties, he could turn with equal alacrity to Euclid or to Racine. In summing up his character, all must agree with Laharpe, that he was "a man who did honour to France, to the magistracy, and to letters, by his virtues, his talents, his profound and various learning, and his enlightened views in the science of jurisprudence." (*Cours de Littérature*, tom. xiv. c. 1.)

His published writings form a collection of thirteen volumes quarto, of which the first was published at Paris in 1759, and the last in 1789. The far greater part of these volumes relates to matters connected with his professional occupations and studies; but they also contain a variety of pieces upon other subjects. We have already mentioned his Discourses on the studies befitting the students of law, and his treatise on Money. Besides these, and some Theological Pieces, there is a Life of his Father,—interesting from the view which it affords of his own early education under that excellent person; and Metaphysical Meditations, written in vindication of the grand truth, that independently of all revelation, and all positive law, there is that in the constitution of the human mind which renders *man a law to himself.*

See—*Histoire des Hommes Illustres de Regnes de Louis* XIV. *et de Louis* XV. par le Duc de Saint-Simon; *Mémoires Secretes*, par Duclos; *Les Loisirs d'un Ministre d'Etat*, par D'Argenson; *Eloge de D'Aguesseau*, par Thomas.

AGUILAR, a town in the arrondissement of Campena, and province of Cordova, in Spain. It is situated on the river Cabra, has 1600 inhabitants, and produces abundance of oil.

AGUILAR, a town of Spain, in the province of Navarre, about 24 miles west from Estella.

Aguilar del Campo, a town of Old Castile, with the title of marquisate, about 15 leagues north of the city of Burgos.

AGUILLANEUF, or AUGILLANEUF, a form of rejoicing used among the ancient Franks on the first day of the year. The word is compounded of the French *A*, to, *gui*, misletoe, and *l'an neuf*, the new year. Its origin is traced from a druid ceremony: the priests used to go yearly in December, which with them was reputed a sacred month, to gather misletoe of the oak, in great solemnity. The prophets marched in the front, singing hymns in honour of their deities; after them came a herald with a caduceus in his hand; these were followed by three druids abreast, bearing the things necessary for sacrifice; last of all came the chief or arch druid, accompanied with the train of people. The chief druid, climbing the oak, cut off the misletoe with a golden sickle, and the other druids received it in a white cloth. On the first day of the year it was distributed among the people, after having blessed and consecrated it by crying *A gui l'an neuf*, to proclaim the new year.

AGUILLON, or AGUILLONIUS, FRANCIS, a Jesuit, born at Brussels. He was rector of the Jesuits college at Antwerp, and eminent for his skill in mathematics. He was the first who introduced that science among the Jesuits in the Low Countries. He wrote a book of Optics, and was employed in finishing his Catoptrics and Dioptrics when he died in 1617.

AGUIRRA, JOSEPH SAENZ DE, a Benedictine, and one of the most learned men of the 17th century, was born March 24, 1630. He was censor and secretary of the supreme council of the inquisition in Spain, and interpreter of the Scriptures in the university of Salamanca. He printed three volumes in folio upon Philosophy, a commentary upon Aristotle's ten books of Ethics, and other pieces. He died at Rome in 1699.

AGUR. The xxxth chapter of the Proverbs begins with this title,—"The words of Agur, the son of Jakeh;" which, according to the signification of the original terms, may be translated, as the Vulgate has it, *Verba congregantis, filii vomentis;* which translation Le Clerc condemns, supposing these to be proper names which ought not to be translated. These words are rendered by Louis de Dieu, "the words of him who has recollected himself, the son of obedience." The generality of the fathers and commentators will have it that Solomon describes himself under the name of Agur the son of Jakeh; others conjecture that Agur, as well as Lemuel (in chap. xxxi. 1), were wise men who lived in the time of Solomon, and were his interlocutors in the book of Proverbs; an opinion which F. Calmet thinks is without the least show of probability, this book being nothing like a dialogue. This last expositor thinks it probable that Agur was an inspired author different from Solomon, whose sentences it was thought fit to join with those of this prince, because of the conformity of their matter.

AGURAH, in *Jewish Antiquity*, the name of a silver coin, otherwise called *gerah* and *keshita*.

AGUSADURA, in ancient customs, a fee due from vassals to their lord for the sharpening of their ploughing tackle. Anciently the tenants in some manors were not allowed to have their rural implements sharpened by any but whom the lord appointed, for which an acknowledgement was to be paid, called *agusadura*, in some places *agusage;* which some take to be the same with what was otherwise called *reillage*, from the ancient French *reille*, a ploughshare.

AGYEI, in *Antiquity*, a kind of obelisks, sacred to Apollo, erected in the vestibules of houses, by way of security.

AGYNIANI, in *Church History*, a sect who condemned all use of flesh, and marriage, as not instituted by God, but introduced at the instigation of the devil. The word is compounded of the privative *α*, and *γυνη*, *woman*. They are sometimes also called *Agynensis*, and *Agynii;* and are said to have appeared about the year 694. It is no wonder they were of no long continuance. Their tenets coincide in a great measure with those of the Abelians, Gnostics, Cerdonians, and other preachers of chastity and abstinence.

AGYRTÆ, in *Antiquity*, a kind of strolling impostors, running about the country to pick up money, by telling fortunes at rich men's doors; pretending to cure diseases by charms, sacrifices, and other religious mysteries; also to expiate the crimes of their deceased ancestors, by virtue of certain odours and fumigations; to torment their enemies, by the use of magical verses, and the like. The word is Greek, *Αγυρται*, formed of the verb *αγειρω*, *I congregate;* alluding to the practice of charlatans or quacks, who gather a crowd about them.

Agyrtæ, among the Greeks, amount to the same with *Æruscatores* among the Latins, and differ not much from gypsies among us.

AHAB, son of Omri, king of Israel, succeeded his father A. M. 3086, and surpassed all his predecessors in impiety and wickedness. He married Jezebel, the daughter of Ethbaal, king of the Zidonians, who introduced the idols of Baal and Astarte among the Israelites, and engaged Ahab in the worship of these false deities. God, being provoked by the sins of Ahab, sent the prophet Elijah to him (1 Kings xvii. 1, *seq.*), who declared to him that there would be a famine of three years' continuance. The dearth having lasted three years, the prophet desired Ahab to gather all the people to Mount Carmel, and with them the prophets of Baal: when they were thus assembled, Elijah caused fire to descend from heaven upon his sacrifice; after which he obtained of God that it should rain, and then the earth recovered its former fertility. Six years after this, Ben-hadad, king of Syria (chap. xx.), laid siege to Jerusalem. But God, provoked at this proud Syrian, sent a prophet to Ahab, not only to assure him of victory, but to instruct him likewise in what manner he was to obtain it. Ahab was ordered to review the princes of the provinces, which he found to be a choice company, consisting of 232 young men, who were to command the people in Samaria, amounting to about 7000 men. With this small army Ahab was directed to fall upon the great host of the Syrians, and that at noon-day, while Ben-hadad and the 32 kings that accompanied him were drinking and making merry. Ben-hadad having notice that they were marching out of the city, ordered them to be brought before him alive, whatever their designs were; but the young men, followed by this small army, advanced, and killed all that opposed them. Such a panic seized the Syrian troops, that they began to fly, and even Ben-hadad himself mounted his horse and fled with his cavalry; which Ahab perceiving, pursued them, killed great numbers of them, and took a considerable booty. After this the prophet came to Ahab, to animate him with fresh courage, and to caution him to keep upon his guard, assuring him that Ben-hadad would return against him the year following. According to this prediction, at the end of the year he returned and encamped at Aphek, with a resolution to give the Israelites battle. Both armies being ranged in order of battle for seven days successively, at length, upon the seventh day, a battle ensued, wherein the Israelites killed 100,000 of the Syrians, and the rest fled to Aphek; but as they were pressing to get into the city, the walls of Aphek fell upon them, and killed 27,000 more. Ben-hadad throwing himself upon the mercy of Ahab, this prince received him into his own chariot, and made an alliance with him. The year following, Ahab desiring to make a kitchen-garden near his palace (chap xxi.), requested of one Naboth, a citizen of Jezreel, that he would sell him his vineyard, because it lay conveniently for him. But being refused, he returned in great discontentment to his house, threw himself upon the bed, turned towards the wall, and would eat nothing. Jezebel his wife coming in, asked the reason of his great concern, of which being informed, she procured the death of Naboth, and Ahab took possession of his vineyard. As he returned from Jezreel to Samaria, the prophet Elijah met him, and said, "Hast thou killed, and also taken possession? Thus saith the Lord, In the place where dogs licked the blood of Naboth, shall dogs lick thy blood, even thine. As for Jezebel, of her the Lord spoke, saying, The dogs shall eat Jezebel by the way of Jezreel." Ahab, hearing these and other denunciations, rent his clothes, put sackcloth upon his flesh, and gave other indications of his sorrow and repentance. But his repentance was neither sincere nor persevering. Two years after these things, Jehoshaphat, king of Judah, came to Samaria to visit Ahab (chap. xxii.), at a time when he was preparing to attack Ramoth-gilead, which Ben-hadad, king of Syria, unjustly withheld from him. The king of Israel invited Jehoshaphat to accompany him in this expedition, which that prince agreed to do, but desired that some prophet might first be consulted. Ahab therefore assembled the prophets of Baal, in number about 400, who all concurred in exhorting the king to march resolutely against Ramoth-gilead. But Micaiah, being also consulted at Jehoshaphat's suggestion, prophesied the ruin of Ahab. Upon this Ahab gave orders to his people to seize Micaiah, and to carry him to Amon the governor of the city, and to Joash the king's son, telling him in his name, "Put this fellow in the prison, and feed him with bread of affliction and with water of affliction, until I come in peace." But Micaiah said, "If thou return at all in peace, the Lord hath not spoken by me." Ahab, therefore, and Jehoshaphat, marched up to Ramoth-gilead; and the king of Israel said unto Jehoshaphat, "I will disguise myself, and enter into the battle; but put thou on thy robes:" for he knew that the king of Syria had commanded two-and-thirty captains that had rule over his chariots, saying, "Fight neither with small nor with great, save only with the king of Israel." These officers, therefore, having observed that Jehoshaphat was dressed in royal robes, took him for the king of Israel, and fell upon him with great impetuosity: but this prince seeing himself pressed so closely, cried out; and the mistake being discovered, the captains of the king of Syria gave over pursuing him. But one of the Syrian army shot a random arrow, which pierced the heart of Ahab. The battle lasted the whole day, and Ahab continued in his chariot with his face turned towards the Syrians. In the mean time his blood was still issuing from his wound and falling into his chariot, and towards the evening he died; whereupon proclamation was made, by the sound of trumpet, that every man should return to his own city and country. The king of Israel being dead, was carried to Samaria and buried; but his chariot and the reins of his horses were washed in the fish-pool of Samaria, and the dogs licked his blood, according to the word of the prophet. Such was the end of Ahab. His son Ahaziah succeeded him in the year of the world 3107.

AHASUERUS, or ARTAXERXES, the husband of Esther, and, according to Archbishop Usher and F. Calmet, the Scripture name for Darius, the son of Hystaspes, king of Persia; though Scaliger supposed Xerxes to have been the husband of Esther, or the Ahasuerus of Scripture; and Dr Prideaux believes him to be Artaxerxes Longimanus. See History of PERSIA.

AHAUS, a circle in the department of Munster, and Prussian province of Westphalia, formed out of the old lordships of Bocholt and Horstmar. It is 301 square miles, or 192,640 acres, in extent, comprehending three cities, six market towns, and 58 parishes, with 33,470 inhabitants. The soil is moderately fertile, and yields moderate crops of corn, buck-wheat, and flax. It is watered by the Aa, the Berkel, the Bechta, the Dinkel, and several smaller streams. The most valuable products are cattle, and especially sheep. There is some little spinning and weaving of linen; but the higher wages paid in Holland induce the labourers to go to that country, in the seasons of hay and corn harvest, to save the means of subsistence for the winter.—The chief city of the circle, of the same name, is the residence of the count, now mediatized; and contains, besides his castle, 300 houses, and 1103 inhabitants. Long. 7. 4. 34. E. Lat. 52. 4. 38. N.

AHAZ, king of Judah, the son of Jotham, remarkable for his vices and impieties. One of his sons he consecrated, by making him pass through and perish by the fire, in honour of the false god Moloch; and he offered sacrifices and incense upon the high places, upon hills, and in groves. Rezin, king of Syria, and Pekah, king of Israel, invaded Judah in the beginning of the reign of Ahaz; and having defeated his army and pillaged the country, they laid siege to Jerusalem. When they found that they could not make themselves masters of that city, they divided their army, plundered the country, and made the inhabitants prisoners of war. Rezin and his part of the confederate army marched with all their spoil to Damascus; but Pekah, with his division of the army, having attacked Ahaz, killed 120,000 men of his army in one battle, and carried away men, women, and children, without distinction, to the number of 200,000. But as they were carrying those captives to Samaria, the prophet Oded, with the principal inhabitants of the city, came out to meet them, and by their remonstrances prevailed with them to set their prisoners at liberty. At the same time the Philistines and Edomites invaded other parts of his land, killed multitudes of the people, and carried off much booty. In this distressed condition, Ahaz, finding no other remedy for his affairs, sent ambassadors to Tiglath-pileser, king of the Assyrians; and to engage him to his interest, he stripped the temple and city of all the gold which he could meet with, and sent it as a present. Accordingly Tiglath-pileser marched to the assistance of Ahaz, attacked Rezin, and killed him, took his capital Damascus, destroyed it, and removed the inhabitants thereof to Cyrene.

The misfortunes of this prince had no influence to make him better; on the contrary, in the times of his greatest affliction, he sacrificed to the Syrian deities, whom he looked upon as the authors of his calamities, and endeavoured to render propitious to him, by honouring them in this manner. He broke in pieces the vessels of the house of God, shut up the gates of the temple, and erected altars in all parts of Jerusalem. He set up altars likewise in all the cities of Judah, with a design to offer incense on them. At length he died, and was buried in Jerusalem, but not in the sepulchres of the kings of Judah his predecessors; which honour he was deprived of on account of his iniquitous course of life. Hezekiah his son succeeded him in the year of the world 3287, before Jesus Christ 726.

AHAZIAH, the son and successor of Ahab, king of Israel, reigned two years, part alone, and part with his father Ahab, who ordained him associate in the kingdom a year before his death. Ahaziah imitated his father's impieties (1 Kings xxii. 52, *seq.*), and paid his adoration to Baal and Astarte, the worship of whom had been introduced into Israel by Jezebel, his mother. The Moabites, who had been always obedient to the kings of the ten tribes ever since their separation from the kingdom of Judah, revolted after the death of Ahab, and refused to pay the ordinary tribute. Ahaziah had not leisure or power to reduce them (2 Kings i. 1, 2, &c.); for about the same time, having fallen through a lattice from the top of his house, he hurt himself considerably, and sent messengers to Ekron, in order to consult Baalzebub, the god of that place, whether he should recover of the indisposition occasioned by this accident. But the prophet Elijah went to Ahaziah, and declared that he should not recover from his illness; and accordingly he died in the year of the world 3108, and Jehoram his brother succeeded to the crown.

Ahaziah, king of Judah, the son of Jehoram and Athaliah, succeeded his father in the kingdom of Judah, in the year of the world 3119. He walked in the ways of Ahab's house, to which he was allied. He reigned only one year. He was slain by Jehu the son of Nimshi.

AHEAD, a sea-term, signifying farther onward than the ship, or at any distance before her, lying immediately on that point of the compass to which her stem is directed. It is used in opposition to *astern*, which expresses the situation of any object behind the ship.

AHIJAH, the prophet of Shiloh. He is thought to be the person who spoke twice to Solomon from God; once while he was building the temple (1 Kings vi. 11), at which time he promised him his protection; and at another time (*id.* xi. 6) after his falling into all his irregularities, when God expressed his indignation with great threatenings and reproaches. Ahijah was one of those who wrote the annals or history of this prince (2 Chr. ix. 29). The same prophet declared to Jeroboam that he would usurp the kingdom (1 Kings xi. 29, &c.), and that two heifers should alienate him from the Lord, meaning the golden calves erected by Jeroboam, one at Dan, the other at Bethel. About the end of Jeroboam's reign, towards the year of the world 3046, Abijah, the son of that prince, fell sick; upon which Jeroboam sent his wife to this prophet to inquire what would become of the child. The queen therefore went to Ahijah's house in Shiloh, disguised; but the prophet, upon hearing the sound of her feet, said, "Come in, thou wife of Jeroboam, why feignest thou thyself to be another? for I am sent to thee with heavy tidings." Then he commanded her to go and tell Jeroboam all the evil that the Lord had declared he would bring upon his house for his impieties; that so soon as she should enter into the city her son Abijah should die, and should be the only one of Jeroboam's house that should come to the grave or receive the honours of a burial. Ahijah in all probability did not long survive the time of this last prophecy; but with the time and manner of his death we are not acquainted.

AHJOLI, a city on the bay of Borgas, in the Black Sea, surrounded with many wind-mills, and of commercial consequence from the copious springs, from which salt is made. It is in the Turkish province of Silistria, a part of ancient Bulgaria.

AHITHOPHEL, a native of Gillo, was for some time the counsellor of King David, whom he at length deserted by joining in the rebellion of Absalom. This prince, upon his being preferred to the crown by the greater part of the Israelites, sent for Ahithophel from Gillo (2 Sam. xv. 12) to assist him with his advice in the present state of his affairs; for at that time Ahithophel's counsels were received as the oracles of God himself (chap. xvi. *ult.*). Nothing gave David more uneasiness than this event; and when Hushai his friend came to wait on him and attend him in his flight, he entreated him to return rather to Jerusalem, make a show of offering his services to Absalom, and endeavour to frustrate the prudent measures which should be proposed by Ahithophel. When Absalom was come to Jerusalem, he desired Ahithophel to deliberate with his other counsellors upon the measures which were proper for him to take. Ahithophel advised him, in the first place, to abuse his father's concubines; so that when his party should understand that he had dishonoured his father in this manner, they might conclude that there were no hopes of a reconciliation, and therefore espouse his interest more resolutely. A tent, therefore, being prepared for this purpose upon the terrace of the king's palace, Absalom, in the sight of all Israel, lay with his father's concubines. The next thing Ahithophel proposed was in the terms following: "Let me now choose out 12,000 men, and I will arise and pursue after David this night; and I will come upon him while he is weary and weak-handed, and will make him afraid; and all the people that are with him shall flee, and I will smite the king only; and I will bring back all the people unto thee: the man whom thou seekest is as if all returned; so all the people shall be in peace." This advice was very agreeable to Absalom and all the elders of Israel. However, Absalom desired Hushai to be called to have his opinion. Hushai being come, and hearing what advice Ahithophel had given, said, "The counsel which Ahithophel has given is not good at this time; what, for the present, in my opinion, may do better, is this: "Let all Israel be gathered unto thee, from Dan even to Beersheba, as the sand that is by the sea for multitude, and put thyself in the midst of them; and wherever David is, we will fall upon him, and overwhelm him with our numbers, as the dew falleth upon the ground." The last advice, being more agreeable to Absalom and all the elders of Israel, was preferred; upon which Ahithophel saddled his ass, went to his house at Gillo, hanged himself, and was buried in the sepulchre of his fathers. He foresaw, without doubt, all that would happen in consequence of Hushai's advice, and was determined to prevent the death which he had deserved, and which David would probably have inflicted on him as soon as he should be resettled on his throne.

AHOLIBAH and Aholah are two feigned names made use of by Ezekiel (xxiii. 4) to denote the two kingdoms of Judah and Samaria. Aholah and Aholibah are represented as two sisters of Egyptian extraction. Aholah stands for Samaria, and Aholibah for Jerusalem. The first signifies a *tent;* and the second, *my tent is in her.* They both prostituted themselves to the Egyptians and Assyrians, in imitating their abominations and idolatries; for which reason they were abandoned to those very people for whom they had shown so passionate and so impure an affection. They were carried into captivity, and reduced to the severest servitude.

AHRWEIL, a circle in the department of Coblentz, and the Prussian province of the Lower Rhine. It extends over 96 square miles, or 61,440 acres; contains 24,745 inhabitants, all Catholics except 400 Protestants, in three cities, two market towns, and 186 villages. The Rhine washes its eastern border, and receives the water of the Ahr, which issues out of a fertile valley, near Sinzig, whence some good wine from the sides of the hills is produced. The rest of the district is poor in agriculture, and only somewhat better in breeding cattle, and furnishing fish, game, wood, and stone. The capital is a small city of the same name. It is built on the banks of the Ahr, containing 400 houses, and 2079 inhabitants, chiefly tanners, curriers, and makers of wine.

AHULL, in the sea language, the situation of a ship when all her sails are furled on account of the violence of the storm, and when, having lashed her helm on the lee-side, she lies nearly with her side to the wind and sea, her head being somewhat inclined to the direction of the wind.

AHUN, a town of France, in the Upper Marche and generality of Moulins, in the department of Creuse. It is seated on the river Creuse, eight miles south-east of Gueret, 30 north-east of Lomages, and 55 south-east of Moulins. Long. 1. 52. E. Lat. 49. 5. N.

AHUYS, a town of Gothland, in Sweden. It is small, but very strong by its situation, and has a good port. It is in the principality of Gothland, in the territory of Bleckingy, near the Baltic Sea, about 18 miles from Christianstadt. Long. 14. 10. E. Lat. 56. 20. N.

AI, in *Ancient Geography*, a town in Judea, to the north of Jericho, called Αινα by Josephus, and the inhabitants *Ainatæ*. Joshua having sent a detachment of 3000 men against Ai, God permitted them to be repulsed on account of Achan's sin, who had violated the anathema pronounced against the city of Jericho. But after the expiation of this offence, God commanded Joshua (chap. viii.) to march with the whole army of the Israelites against Ai, and treat this city and the kingdom thereof as he had treated Jericho, with this difference, that he gave the plunder of the town to the people. Joshua sent by night 30,000 men to lie in ambush behind Ai, having first well instructed those who had the command of them in what they were to do; and the next day, early in the morning, he marched against the city with the remainder of his army. The king of Ai perceiving them, sallied hastily out of the town with all his people, and fell upon the forces of the Israelites, who, upon the first onset, fled, as if they had been under some great terror.

As soon as Joshua saw the enemy all out of the gates, he raised his shield upon the top of a pike, which was the signal given to the ambuscade; whereupon they immediately entered the place, which they found without defence, and set fire to it. The people of Ai perceiving the smoke ascending, were willing to return, but discovered those who had set fire to the city in their rear; while Joshua and those who were with him turning about, fell upon them, and cut them in pieces. The king was taken alive, and afterwards put to death.

AJACCIO, or Ajazzo, an arrondissement in the island and department of Corsica, in the Mediterranean, containing 12 cantons and 72 communes, with 36,980 inhabitants. The extent is 736 square miles, or 460,000 English acres. The capital, which bears the same name, and is the best built town in the island, is situated in a fertile territory, which produces excellent wines. It has a small citadel and an excellent harbour, and contains 6840 inhabitants. It is celebrated as the birth-place of Napoleon Buonaparte.

AJALON, in *Ancient Geography*, a town of the tribe of Dan, one of the Levitical. Another in the tribe of Benjamin, in whose valley Joshua commanded the moon to stand still, being then in her decrease, and consequently to be seen at the same time with the sun.

AJAN, a coast and country of Africa, has the river Quilimanci on the south; the mountains from which the river springs, on the west; Abyssinia or Ethiopia, and the strait of Babelmandel, on the north; and the Eastern or Indian Ocean on the east. The coast abounds with all the necessaries of life, and has plenty of very good horses. The whole sea-coast, from Zanguebar to the strait of Babelmandel, is called the coast of Ajan; and a considerable part of it is styled the Desert coast.

AJAX, the son of Oileus, was one of the principal generals who went to the siege of Troy. He ravished Cassandra, the daughter of Priam, even in the temple of Minerva, where she thought to have found sanctuary. It is said he made a serpent of 15 feet long so familiar with him, that it ate at his table, and followed him like a dog. The Locrians had a singular veneration for his memory.

Ajax, the son of Telamon, was, next to Achilles, the most valiant general among the Greeks at the siege of Troy. He commanded the troops of Salamis, and performed many great actions, of which we have an account in the Iliad, in *Dictys Cretensis*, and in the 23d book of Ovid's Metamorphoses. He was so enraged that the arms of Achilles were adjudged to Ulysses, that he immediately became mad. The Greeks paid great honour to him after his death, and erected a magnificent monument to his memory, upon the promontory of Rhetium.

Ajax, in *Antiquity*, a furious kind of dance, in use among the Grecians; intended to represent the madness of that hero after his defeat by Ulysses, to whom the Greeks had given the preference in his contest for Achilles's arms. Lucian, in his treatise of Dancing, speaks of dancing the *Ajax.*—There was also an annual feast called *Ajantia*, Αιαντια, consecrated to that prince, and observed with great solemnity in the island of Salamis, as well as in Attica; where, in memory of the valour of Ajax, a bier was exposed, set out with a complete set of armour.

Ajazzo, a seaport town of Natolia, in the province of Caramania, anciently Cilicia, seated on the coast of the Mediterranean, 30 miles north of Antioch, and 50 west of Aleppo, where the city of Issus anciently stood and near which Alexander fought his second battle with Darius. Long. 36. 10. E. Lat. 37. N.

AICHSTADT, a town of Germany, in Franconia, and capital of a bishopric of the same name. It is remarkable for a curious piece of workmanship, called the Sun of the Holy Sacrament, which is in the church. It is of massy gold, of great weight, and is enriched with 350 diamonds, 1400 pearls, 250 rubies, and other precious stones. This place is moderately large, and seated in a valley on the river Altmuhl, 10 miles north of Nienburg, and 37 south of Nuremberg. Long. 11. 10. E. Lat. 49. N. The bishopric is 45 miles in length and 17 in breadth; and the bishop is chancellor of the church of Mayence or Mentz.

AID, *Auxilium*, in ancient customs, a subsidy paid by vassals to their lords on certain occasions.

Aid-de-Camp, in military affairs, an officer employed to receive and carry the orders of a general.

AIDS, in the French customs, were certain duties paid on all goods exported or imported into that kingdom.

Court of Aids, in France, a sovereign court formerly established in several cities, which had cognizance of all causes relating to the taxes, gabelles, and aids, imposed on several sorts of commodities, especially wine.

AIDAN, a famous Scottish bishop of Lindisfarne, or Holy Island, in the 7th century, was employed by Oswald, king of Northumberland, in the conversion of the English, in which he was very successful. He was a monk in the monastery of Iona, one of the Hebrides. He died in 651.

AIDONA, a city of Sicily, on the river Gabelle, in the Val di Notto, containing about 3700 inhabitants.

AJELLO, a town in the province of Abruzzo Ulteriore Second, in the kingdom of Naples, but belonging to the duke of Modena. It contains 2195 inhabitants.

AIGHENDALE, the name of a liquid measure used in Lancashire, containing seven quarts.

AIGLE, a bailiwick in the territory of Romand in Switzerland, consists of mountains and valleys, the principal of which are the Aigle and Bex. Through these is the great road from Valais into Italy. When you pass by Villeneuve, which is at the head of the lake of Geneva, you enter into a deep valley three miles wide, bordered on one side with the Alps of Switzerland, on the other side with those of Savoy, and crossed by the river Rhone. Six miles from thence you meet with Aigle, a town containing 2500 inhabitants, seated in a wide part of the valley, where there are vineyards, fields, and meadows. The governor's castle is on an eminence that overlooks the town, and has a lofty marble tower. This government has nine large parishes; and is divided into four parts, Aigle, Bex, Olon, and Ormont. This last is among the mountains, and joins to Rougemont. It is a double valley, abounding in pasture lands. Ivorna, in the district of Aigle, was in part buried by the fall of a mountain, occasioned by an earthquake, in 1584.

Aigle, a city in France, in the arrondissement of Mortagne, and department of the Orne. It is situated on the river Rille, which divides it into three parts; one on each side of the river, and one in an island formed by two channels of it. It contains 844 houses, and 5780 inhabitants. It is an industrious place, with manufactures of linen, cotton, paper, leather, cutlery, needles, bottles, and other wares.

AIGUES-PERSES (*Aquæ-Sparsæ*), a town of France, situated in the Lyonnois, in the department of Puy-de-Dome, about 15 miles north of Clermont.

Aigues-Perses, a town of France, in the district of Ville Franche, near to Lyons, with 1540 inhabitants. It is the birth-place of the celebrated Chancellor L'Hôpital. Near to it is a well of poisonous quality, which is mortal to all animals drinking it.

AIGUILLON, a town of the district of Agenois, in Guienne, in France, at the conflux of the river Garonne and Lot, containing 3540 inhabitants.

AIGUISCE, in *Heraldry*, denotes a cross with its four ends sharpened, but so as to terminate in obtuse angles. It differs from the cross fitchee, inasmuch as the latter tapers by degrees to a point, and the former only at the ends.

AIGURANDES, a town of France, in the arrondissement of La Châtre, and department of the Indre. It is on the river Bourdesoule, surrounded with walls and ditches; containing 270 houses, and 1620 inhabitants, who carry on a great trade in cattle.

AIKMAN, William, a painter of considerable eminence, was born in Scotland, October 24. 1682. He was the son of William Aikman, Esq. of Cairney, and was intended by his father to follow his own profession, which was that of an advocate at the Scotish bar. But the genius of the son led him to other studies. He devoted himself to the fine arts, especially that of painting; and having for some time prosecuted his studies in Britain, in the year 1707 he went to Italy, resided in Rome for three years, afterwards travelled to Constantinople and Smyrna, and in 1712 returned to his own country. About the year 1723 he fixed his residence in London, where he followed the profession of painting, and had the good fortune to be patronised by the duke of Argyle, the earl of Burlington, Sir Godfrey Kneller, and other liberal encouragers of the arts. He painted many portraits of persons of the first rank in England and Scotland, and a large picture of the royal family for the earl of Burlington, now in the possession of the duke of Devonshire, which was unfinished at his death. Some of his portraits painted in Scotland are in the possession of the duke of Argyle, the duke of Hamilton, and others. Mr Aikman died in London, June 4. 1731. Six months previous to his death he had lost a son at the age of 17. The remains of both were removed to Edinburgh, and were interred in the Greyfriars church-yard on the same day. Mr Somerville, the author of the Chace, Mr Mallet, Mr Allan Ramsay the Scottish poet, and Mr Thomson, were among Mr Aikman's intimate acquaintance; and the muse of each, in elegiac numbers, offered a warm tribute to the memory of their departed friend. The following epitaph, from the pen of Mr Mallet, was engraved on his tomb:

> Dear to the good and wise, disprais'd by none,
> Here sleep in peace the father and the son;
> By virtue, as by nature, close ally'd,
> The painter's genius, but without the pride;
> Worth unambitious, wit afraid to shine,
> Honour's clear light, and friendship's warmth divine.
> The son, fair rising, knew too short a date;
> But, oh! how more severe the father's fate!
> He saw him torn untimely from his side,
> Felt all a father's anguish—wept, and died.

Mr Aikman's style of painting was an imitation of the pleasing simplicity of nature. It is distinguished by softness of light, mellowness of shade, and mildness and harmony of colouring. His compositions have more placid tranquillity of ease than boldness of touch and brilliancy of effect. His portraits are supposed to have some resemblance to those of Kneller, not only in the imitation of the dresses of the time, but in the similarity of tint and manner of working.

AILANA, Ailath, or Aheloth, anciently a town of Arabia Petræa, situated near the Sinus Elanites of the Red Sea. It is also called *Eliath*, and *Eloth* (Stephanus, Strabo, Moses). The same with *Elana*.

AILE, in *Law*, a writ which lies where a person's grandfather or great-grandfather was seised of lands, &c. in fee-simple, the day that he died, and a stranger abates and enters the same day, and dispossesses the heir of his inheritance.

AILESBURY, or Aylesbury, a borough town in Buckinghamshire. In the middle of the market-place is a handsome and convenient hall, where the sessions are held. The church is an ancient and spacious structure. Lace-making is carried on to a considerable extent. It returns two members to parliament. Population in 1831, 4907.

AILMER, or Æthelmare, earl of Cornwall and Devonshire in the reign of King Edgar. It is not known of what family he was. His authority and riches were great, and so also in appearance was his piety. He founded the abbey of Cernel, in Dorsetshire; and had so great a veneration for Eadwald, the brother of St Edmund the Martyr, who had lived a hermit in that country, near the Silver Well, as it is called, that, with the assistance of Archbishop Dunstan, he translated his relics to the old church of Cernel. In 1016, when Canute, the son of Sueno, invaded England, and found himself stoutly opposed by that valiant Saxon prince Edmund Ironside, the son of Æthelred, this Earl Ailmer, with that arch-traitor Eadric Streone, earl of Mercia, and Earl Algar, joined the Dane against their natural prince, which was one great cause of the Saxons' ruin. He did not long survive this; and we find mentioned in history only one son of his, whose name was Æthelward, earl of Cornwall, who followed his father's maxims, and was properly rewarded for it; for in 1018, Canute, reaping the benefit of their treasons, and perceiving that the traitors were no longer useful, caused the infamous Eadric Streone and this Earl Æthelward to be both put to death.

AILRED, or Ealred, abbot of Revesby, in Lincolnshire, in the reigns of Stephen and Henry II. He was born in 1109, of a noble family, and educated in Scotland with Henry, the son of King David. On his return to England he became a monk of the Cistercian order in the monastery of Revesby, of which he afterwards was made abbot. He died on the 12th of January 1166, aged 57, and was buried in his monastery. "He was," says Leland, "in great esteem during his life, celebrated for the miracles wrought after his death; and admitted into the catalogue of saints." He was author of several works, most of which were published by Gilbo the Jesuit at Douay, 1631: part of them may be also found in the *Bibliotheca Cisterciensis*, and *Bibliotheca Patrum*. His principal work is the *Speculum Charitatis*. Leland, Bale, and Pits, mention several manuscripts which never were published.

AILSA, an insulated rock on the western coast of Scotland, between the shores of Ayrshire and Cantyre. It is two miles in circumference at the base, is accessible only at one place, and rises in a pyramidical form to the height of 940 feet. A few goats and rabbits pick up a subsistence among the grass and furze; but it is frequented by immense numbers of soland geese and other birds, which are valued for their flesh or feathers. The depth of water around the base is from 7 to 48 fathoms. On one part of the rock are the remains of an old castle, which is said to have been erected by Philip II. of Spain, about the time that the Spanish armada invaded Britain.

AJMEER, or Rajpootana, a large province situated in the centre of Hindostan, between the 24th and 31st degrees of N. lat. It is bounded on the north by the provinces of Moultan, Lahore, and Delhi; on the south by Gujerat and Malwah; on the east by Delhi and Agra, and on the west by Moultan and the principality of Sinde. From north to south it extends 350 miles, and is 200 in average breadth. The following are the modern divisions of this province:—

1. The Bhatty country.
2. Bicanere.
3. The Great Sandy Desert.
4. Jesselmere.
5. Joudpoor.
6. Marwar.
7. Nagore.
8. Shekawutty.
9. Jeypoor.
10. Ajmeer district.
11. Harowty.
12. Odeypoor.
13. Mewar.
14. Sarowy.

This province is generally of a barren and sandy soil, in many parts a good deal covered by thorny trees and thickets of the cactus. The province of Marwar has a superior soil, and is in a better state of cultivation than the eastern provinces of Jeypoor and Ajmeer, or the south-western tract of Mewar, including Odeypoor. This part of the country was laid waste to such a degree by the ravages of the Pindarees, that it has yet scarcely recovered. The soil, naturally arid, is in some of the southern provinces rendered productive by streams which descend from the mountains. The Chumbul, Calysina, and Banass are the most considerable streams; and where they afford supplies of moisture, the country presents something like the appearance of verdure. The soil of the whole province is remarkably saline, containing many salt springs and lakes, and producing salt and saltpetre spontaneously. In other parts, in order to procure a supply of water, deep wells are sunk, from which the country being partially irrigated, yields wheat, barley, and other sorts of grain and pulse common in India. In Marwar, where they derive their supplies of water from these deep wells, Bishop Heber mentions that he saw cotton growing of the finest quality, and oxen and sheep which bore evidence, by their size and fatness, of the luxuriance of the pasture. Other parts, again, of the southern provinces are strangely desolate, though the ruins with which they are covered, and the numerous tombs, show that they have been inhabited at no distant period, and that their present desolation has been the work of violence.

Towards the east, and in the north, there is an extensive tract, which is a continued desert of the most dismal appearance. Towards the south mountainous tracts occur, and between Marwar and Mewar they rise to 2000 feet above the level of the sea. The mountains of Aboo, towards the western boundary, rise, it is supposed, to the height of 6000 feet. Except in the mountains, trees are seldom seen; and the consequence is, that timber for building and other purposes is extremely scarce, and proportionably dear. Such is the scarcity of wooden furniture, that at dinner parties it is the practice among the British residents for ladies and gentlemen to send their own chairs to the house where the entertainment is to take place; and they have nothing better for their doors and windows than pieces of matting. The Shekawultz country on the west is sandy, badly watered and cultivated, scattered over with rocky hills, and sprinkled with tufts of long grass and bushes. Yet it contains several large towns; and it seems to lose its title to be included in the desert, when compared with the tract which extends north-east as far as Bahawulpoor, a distance of 280 miles; and even this tract is only for the last hundred miles absolutely destitute of inhabitants, water, or vegetation. For 180 miles the country presents the appearance of hills and valleys of loose and heavy sand from 20 to 100 feet in height. These hills shift their positions; and the passage of the desert is rendered dangerous in summer by clouds of moving sand. Among these sandy deserts villages are occasionally met with, which consist merely of a few round huts of straw, with low conical roofs like stooks of corn. They are surrounded by hedges of dry thorny branches, stuck in the sand. Around these miserable abodes are to be seen a few fields, which depend for water on the rains and dews, and which bear thin crops of the poorest kinds of pulse, and a species of the *holcus spi-*

cactus, which, though it flourishes in the most sterile countries, grows here with difficulty, each stalk several feet from its neighbour. In this arid waste is found in profusion the most juicy of all fruits, the water-melon. Some of these grow to the size of three or four feet in circumference, from a stalk as slender as that of the common melon. Agriculture depends on supplies of water procured from wells thinly scattered over the country, and sunk to the enormous depth of 300 and 345 feet, while some of them are only three feet in diameter. The water is drawn from these wells by water-wheels worked by bullocks, in small quantities, and is brackish and unwholesome. The wells are lined with masonry, and the natives frequently cover them with boards heaped with sand, which effectually conceals them from an enemy. The rest of the desert for 100 miles, from Poogul to Bahawulpoor, is a flat hard clay, which sounds under the horses' hoofs like a board. In some places small sand-hills are formed over the clay, on which a few plants shoot up. But the clay is destitute of all appearance of vegetation; and, excepting at the fort and pool of Monjgur, and two wells about sixteen miles from Bahawulpoor, the country is wholly destitute both of inhabitants and of water. In approaching the town of Bahawulpoor the desert and the cultivated country are separated as if by a marked line. The edge of the desert is skirted by a long row of trees; and beyond it are to be seen clumps of trees, green fields, and wells of abundant and clear water, with houses and every sign of fertility and cultivation. This great desert is 400 miles in breadth, and extends far beyond the limits of Ajmeer. Several tracts are within the limits of the periodical rains, and might be recovered from desolation by industry; but at present these rains are absorbed by the thirsty soil, without any benefit whatever to the inhabitants.

The domestic animals are bullocks and camels. The animals of the desert are, the antelope; the wild ass, remarkable for its shyness and for its speed; the fox; and a curious species of rat, which is found in such numbers that the ground is undermined by it in many parts, and is rendered dangerous to horsemen. The lower classes of the people are Jauts. They are of small stature, ill-looking, and have every appearance of poverty and wretchedness. The upper classes are Rhatore Rajpoots. They are a stout and handsome race, with hooked noses and Jewish features; of haughty manners, indolent in their habits, and almost continually drunk with opium. The inhabitants are estimated at 3,000,000, the Mahometans being to the Hindoos as one to eight. The principal towns are Jeypoor, Joudpoor, Odeypoor, Ajmeer, Kotah, Bondee, Rantampoor, Chitore, Shahpoorah, Bicanere, and Jesselmere. The three grand modern divisions of Rajpootana are, 1*st*, Odeypoor, named also Mewar and the Rana of Chitore; 2*d*, Joudpoor, named also Marwar, and its sovereign occasionally described as the Rhatore Rajah, being of that tribe; 3*d*, Jeypoor, Jynagur, or Ambeer, three names of one state. From the dismemberment of these, the original Rajpoot states, others have been formed, and in later times the rajahs of Jesselmere and Bicanere, and the petty chiefs of Kotah, Boondee, and Banswara.

The country is governed by numerous chiefs, who owe allegiance and pay tribute to their liege lords; and who occasionally, as opportunities occur, have thrown off their dependence, and have set up as independent sovereigns within their own territories. During the scenes of confusion and trouble which took place in Central India, previously to the last war, and general pacification in 1818, Rajpootana was frequently laid waste by the inroads of the Pindarees and other freebooters, who were in many cases abetted by the native chiefs. At that time no title was secure; power was the only rule of right; and various portions of the province were possessed and held by powerful invaders, such as Scindia and Holkar. Such was the anarchy that prevailed in this province, as well as generally in Central India, that every freebooter who could collect a sufficient force extorted contributions from the peaceable inhabitants. The petty chiefs were also frequently involved in war with each other; and the destruction inseparable from such contests added to the mass of misery which already pressed on the country. When the war undertaken by the British in 1817, against the bands of plunderers who infested the country, and spread confusion and misery wherever they appeared, was brought to a successful termination, Ajmeer was finally rescued from the Mahratta influence, and placed under Sir D. Ochterlony, as resident and commander; and a large body of troops was cantoned near the city of Ajmeer, by whose presence the turbulent were overawed, and the public peace preserved. Since this period tranquillity and good order have arisen out of confusion; and the peaceable inhabitants, delivered from rapine, and from the miseries of continued pillage and oppression, have resumed their former occupations of commerce and agriculture. The different chiefs are allowed to regulate their own internal policy; but they are no longer permitted to go to war with each other, all their differences being now referred to the supreme tribunal of British authority. (r.)

AJMEER, a city of Hindostan, in the province of Ajmeer. It is situated on the slope of a hill, and was nearly ruined in the long period of anarchy and misgovernment which prevailed in Central India prior to 1819. It was acquired by the British from Scindia in 1818, when it was in a state of the utmost desolation and decay. After this period it rapidly improved; and in 1823 commerce had revived, and the population had been more than tripled. Bishop Heber, who visited it in 1825, mentions, that it is a well-built town, of moderate size. The buildings are chiefly white-washed; and the surrounding rocks have some thorny trees and brush-wood on them, which hide their barrenness, and make a good back-ground to the little ruinous mosques and Mussulman tombs which are scattered round the circuit of this holy city. Above, on the mountain top, is a very remarkable fortress, called Taraghur, nearly two miles in circuit, but, from its irregular shape and surface, not capable of containing more than 1200 men. It consists of a plain stone-wall along the edge of a mountain, strengthened with a few round bastions; and it has an abundant supply of good water in all seasons, from cisterns cut in the rock. The works of this fortress are now going fast to decay, as it is not the policy of the British government to rely, for their security, on fortresses. The old palace and garden of Shah Jehan still exist, and the former contains several habitable rooms. Ajmeer is renowned as a place of pilgrimage, the great attraction being the tomb of Khoja Mogen ud Deen, famed as a great Mahometan saint, whose miracles are celebrated all over India. The tomb is of white marble, but remarkable neither for style nor beauty of architecture. To this place the emperor Acbar made a pilgrimage on foot, to implore at the sainted tomb the blessing of male offspring. The emperors of Delhi formed a fine fresh-water lake just above the city, which during the rains is six miles in circumference. It supplies the means of irrigation to a large district on its banks, is full of fish, and affords excellent water to the inhabitants of the town. Ajmeer is 80 miles W. S. W. from Jeypoor. Travelling distance from Delhi 230 miles; from Bombay, 650; and from Calcutta, 1030 miles. Long. 74. 28. E. Lat. 26. 31. N. (Bishop Heber's *Journey through the Upper Provinces of India*; Hamilton's *Description of Hindostan*; Elphinstone's *Journey into Afghanistan*.) (r.)

AIN, one of the departments in the south-west of France, deriving its name from a river so called, a part of the ancient province of Burgundy. It is bounded on the north by the departments of Saone-Loire and Jura; on the east by Switzerland and Savoy, from which the Rhone divides it; on the south by the department of Isene, separated also by the Rhone; and on the west by the departments of the Rhone and the Saone-Loire, from both which the Saone divides it. The extent is 2210 square miles, or 1,414,400 acres. The eastern part is very mountainous, being a protraction of the Jura group. The western part is hilly, but interspersed with marshes. Some tracts of valuable land are found in the intervals. The chief products are rye, maize, wheat, some wine, a little salt, and oil. The dairy yields good butter and cheese. The department is divided into five arrondissements, 35 cantons, and 448 communes; and contains 22 cities, 403 market-towns and villages, 1467 hamlets, and about 7000 houses. The population amounts to 346,188 persons, all Catholics, except in the arrondissement of Gers, where the greater part are reformed Protestants.

AINSA, a town of the province of Arragon, in Spain. It is on the bank of the river Cinca, which descends from the Pyrenees, and forms the northern boundary of Arragon. It was the ancient residence of the kings of Arragon when that province formed a distinct kingdom. 500 inhabitants.

AINSWORTH, a township and chapelry in the parish of Middleton and hundred of Salford, in the county of Lancaster. Its population under the different censuses was as follows: In 1811, 1427; in 1821, 1609; and in 1831, 1584.

Ainsworth, *Dr Henry*, an eminent non-conformist divine, who about the year 1590 distinguished himself among the Brownists, which drew upon him such troubles that he was obliged to retire to Holland, and became minister of a church at Amsterdam. His skill in the Hebrew language, and his excellent Annotations on the Holy Scriptures, which are still highly esteemed, gained him great reputation. He also wrote several pieces in defence of the Brownists, and several other works.

Ainsworth, *Robert*, born at Woodyale in Lancashire in 1660, was master of a boarding-school at Bethnal Green, from whence he removed to Hackney, and to other places in the neighbourhood of London. After acquiring a moderate fortune, he retired, and lived privately to the time of his death, which happened in 1743. We are indebted to his industry for a Latin and English Dictionary, which has been much used in schools. It was first published in 1736, and was, after the author's death, enlarged by various hands to 2 vols. 4to, in which form it has been several times reprinted.

AIR, in *Physics*. See Atmosphere, Meteorology, and Pneumatics.

Air, in *Mythology*, was adored by the heathens under the names of Jupiter and Juno; the former representing the superior and finer part of the atmosphere, and the latter the inferior and grosser part. The augurs also drew presages from the clouds, thunder, &c.

Air, in *Painting*, &c. denotes the manner and very life of action; or it is that which expresses the disposition of the agent. It is sometimes also used in a synonymous sense with gesture or attitude.

Air, in *Music*, is taken in different senses. It is sometimes contrasted with harmony, and in this sense it is synonymous with melody in general.—Its proper meaning is, a tune, which is set to words, or to short pieces of poetry, that are called *songs*.

In operas we give the name of *air* to such pieces of music as are formed with measures and cadences to distinguish it from the recitative; and, in general, every piece of music is called an *air* which is formed for the voice, or even for instruments, and adapted to stanzas, whether it forms a whole in itself, or whether it can be detached from any whole of which it forms a part, and be executed alone.

If the subject admits of harmony, and is set in parts, the *air* is, according to their number, denominated a *duet*, a *trio*, a *quartetto*, &c. We need not follow Rousseau and the other philologists in their endeavours to investigate the etymon of the word *air*. Its derivation, though found and ascertained, would contribute little to illustrate its meaning in that remote sense to which, through a long continuance of time, and the various vicissitudes of language, it has now passed. The curious may consult the same article in the *Dictionnaire de Musique* by M. Rousseau.

In modern music, there are several different kinds of *airs*, each of which agrees to a certain kind of dancing; and from these dances the airs themselves take their specific names.

The words to which *airs* are adapted are not always rehearsed in regular succession, nor spoken in the same manner with those of the recitative; and though in general they are very short, yet they are interrupted, repeated, transposed, at the pleasure of the artist. They do not constitute a narrative, which once told is over; they either delineate a picture which it is necessary to contemplate in different points of view, or inspire a sentiment in which the heart acquiesces with pleasure, and from which it is neither able nor willing to be disengaged; and the different phrases of the *air* are nothing else than different manners of beholding the same image. This is the reason why the subject of an *air* should be one. It is by these repetitions properly placed, it is by these redoubled efforts, that an impression, which at first was not able to move you, at length shakes your soul, agitates you, transports you out of yourself; and it is likewise upon the same principle that the runnings, as they are called, or those long, mazy, and inarticulated inflections of the voice, in pathetic *airs*, frequently seem, though they are not always so, improperly placed; for whilst the heart is affected with a sentiment exquisitely moving, it often expresses its emotions by inarticulate sounds, more strongly and sensibly than it could do by words themselves.

The form of *airs* is of two kinds. The small airs are often composed of two strains, which ought each of them to be sung twice; but the important airs in operas are frequently in the form of rondeaus.

Air-Gun, a pneumatic machine for exploding bullets, &c. with great violence. See Pneumatics.

Air-Jacket, a sort of jacket made of leather, in which are several bags or bladders, composed of the same materials, communicating with each other. These are filled with air through a leather tube having a brass stop-cock accurately ground at the extremity, by which means the air blown in through the tube is confined in the bladders. The jacket must be wet before the air be blown into the bags, as otherwise it will immediately escape through the pores of the leather. By the help of these bladders, which are placed near the breast, the person is supported in the water, without making the efforts used in swimming.

Air-Pipes. See Ventilators.

Air-Pump, a machine by which the air contained in a proper vessel may be exhausted or drawn out. See Pneumatics.

Air-Shafts, among *Miners*, denote holes or shafts let down from the open air to meet the adits and furnish fresh air. The damps, deficiency, and impurity of air which occur, when adits are wrought 30 or 40 fathoms long, make it necessary to let down air-shafts, in order to give the air liberty to play through the whole work, and thus discharge bad vapours, and furnish good air for respiration: the expense of which shafts, in regard of their vast depths, hardness of the rock, drawing of water, &c. sometimes equals, nay exceeds, the ordinary charge of the whole adit.

Air-Threads, in *Natural History*, a name given to the long filaments so frequently seen in autumn floating about in the air.

These threads are the work of spiders, especially of that species called the long-legged field spider, which, having mounted to the summit of a bush or tree, darts from its tail several of these threads, till one is produced capable of supporting the creature in the air. On this it mounts in quest of prey, and frequently rises to a very considerable height.

Air-Trunk, the name of a contrivance by Dr Hales, to prevent the stagnation of putrid effluvia in jails and other places, where a great number of people are crowded together in a small space. It consists only of a long square trunk open at both ends, one of which is inserted into the ceiling of the room, the air of which is required to be kept pure, and the other extends a good way beyond the roof. Through this trunk a continued circulation is carried on; and the reason is, that the putrid effluvia which do so much mischief when collected, being much lighter than the pure atmosphere, arise to the top of the room, and, if they there find a vent, will continually go out through it. These effluvia arise in very considerable quantity, being calculated by Dr Keil at no less than 39 ounces from one man in 24 hours.

Air-Vessels are spiral ducts in the leaves, &c. of plants, supposed to be analogous to the lungs of animals, in supplying the different parts of a plant with air.

AIRANI, in *Church History*, an obscure sect of Arians in the fourth century, who denied the consubstantiality of the Holy Ghost with the Father and the Son. They are otherwise called *Airanists;* and are said to have taken their name from one *Airas*, who distinguished himself at the head of this party in the reigns of Valentinian and Gratian.

AIRE, a city of France, head of a canton of the same name, in the circle of St Omer, and department of Pas de Calais. It is situated on the river Lys. The population amounts to 8627 persons, who are chiefly employed in making cotton and woollen goods, hardware, and large quantities of oil from seeds. Long. 0. 12. W. Lat. 50. 38. N.

Aire, a town of France, in the department of Landes, and circle of St Sever, on the left bank of the river Pau. Its population is 3130.

AIRING, a term peculiarly used for the exercising of horses in the open air. It purifies the blood, purges the body from gross humours, and, as the jockies express it, teaches the horse how to make the wind rake equally, and keep time with the other motions of his body. It also sharpens the stomach, and keeps the creature hungry, which is a thing of great consequence, as the stomach of hunters and racers is very apt to fall off, either from want of exercise, or from the too violent exercise which they are often exposed to. If the horse be over-fat, it is best to air him before sunrise and after sunsetting; and in general it is allowed by all that nothing is more beneficial to those creatures than early and late airings. Some of our modern manegers, however, dispute this: they say that the cold of these times is too great for the creature; and that if, in particular, he is subject to catarrhs, rheums, or the like complaints, the dews and cold fogs, in these early and late airings, will be apt to increase all those disorders. Nature, we see, also points out the sun-beams as of great use to these animals, those which are kept hardy and lie out all night always running to those places where the sunshine comes, as soon as it appears in a morning. This should seem to recommend those airings that are to be made before sunset, and a little time after sunrise. As to the caution so earnestly inculcated by Markham, of using these early and late airings for fat horses, it is found unnecessary by many; for they say that the same effect may be produced by airings at warmer times, provided only that they are made longer; and that, in general, it is from long airings that we are to expect to bring a horse to a perfect wind and sound courage.

AIRS, in the *Manege*, are the artificial motions of taught horses, as the demivolt, curvet, capriole, &c.

AIRY, or Aery, among *Sportsmen*, a term expressing the nest of a hawk or eagle.

Airy Triplicity, among *Astrologers*, denotes the three signs, Gemini, Libra, and Aquarius.

AISNE, a department in the north-east division of France, on a river of the same name, formed out of divisions of the ancient provinces—Isle of France, Picardy, and Champagne. It is bounded on the north by the department of the North and the kingdom of the Netherlands, on the east by the departments of the Ardennes and Marne, on the south by the Marne and Seine-Marne, and on the west by the Oise and Somme. The extent is 2912 square miles, or 1,872,977 acres. The whole department is a plain, with few hills of much elevation. The soil is generally calcareous, except in the northern part, where it becomes clayey, and in some spots slaty. It is of various degrees of fertility, but for the most part adapted to the growth of corn. Wine, cider, flax, are the other agricultural products. The manufactures are of cotton, linen, and hosiery. The department is divided into five arrondissements, 37 cantons, and 853 communes. Its population is 527,095. The chief city of the department is Laon, with 8400 inhabitants.

AITOCZU, a considerable river of Lesser Asia, which rises in Mount Taurus, and falls into the south part of the Euxine Sea.

AITON, William, an eminent botanist and gardener, was born at a village near Hamilton in Scotland in 1731. Having been regularly trained to the profession of a gardener, he came into England in the year 1754, and soon obtained the notice of the celebrated Philip Miller, then superintendent of the physic garden at Chelsea, who engaged him as an assistant. His industry and abilities recommended him to the princess-dowager of Wales as a fit person to manage the botanical garden at Kew. In 1759 he was appointed to this office, in which he continued during life, and which was the source of his fame and fortune. The garden at Kew, under the auspices of his present Majesty, was destined to be the grand repository of all the vegetable riches which could be accumulated by regal munificence, from researches through every quarter of the globe. These treasures were fortunately committed to the hands of Mr Aiton, whose care and skill in their cultivation, and intelligence in their arrangement, acquired him high reputation among the lovers of the science, and the particular esteem of his royal patrons. Under his superintendence many improvements took place in the plan and edifices of Kew gardens, which rendered them the principal scene of botanical culture in the kingdom. In 1783 his merit was properly rewarded with the lucrative office of managing the pleasure and kitchen gardens of Kew, which he was allowed to retain with the botanical department. In 1789 he published his *Hortus Kewensis*, or a Catalogue of the Plants cultivated in the Royal Botanical Garden at Kew, in 3 vols. 8vo, with 13 plates; a work which had been the labour of many years. The number of species contained in this work amounted to between five and six thousand, many of which had not before been described. A new and curious article in it relates to the first introduction of particular exotics into the English gardens. The system of arrangement adopted is the Linnæan, with improvements, which the advanced state of botanical science required. Mr Aiton, with candour and modesty, acknowledges the assistance he received in this work from the two eminent Swedish naturalists, Dr Solander and Mr Jonas Dryander. Indeed, his character was such as secured him the friendship and good offices of the most distinguished names in science of his time. He was for many years peculiarly honoured by the notice of Sir Joseph Banks, the president of the Royal Society. The *Hortus Kewensis* was received with avidity by the botanic world, and a large impression was soon disposed of.

Notwithstanding the singular activity and temperance of Mr Aiton, he fell into that incurable malady, a schirrous liver, of which he died in 1793, in his 62d year. His eldest son, devoted to the same pursuits, was, by the king's own nomination, appointed to all his father's employments. Mr Aiton's private character was highly estimable for mildness, benevolence, piety, and every domestic and social virtue. He was interred in the church-yard of Kew, amidst a most respectable concourse of friends.

AIUS LOCUTIUS, the name of a deity to whom the Romans erected an altar. The words are Latin, and signify "a speaking voice." The following accident gave occasion to the Romans erecting an altar to Aius Locutius. One M. Seditius, a plebeian, acquainted the tribunes that, in walking the streets by night, he had heard a voice over the temple of Vesta, giving the Romans notice that the Gauls were coming against them. The intimation was, however, neglected; but after the truth was confirmed by the event, Camillus acknowledged this voice to be a new deity, and erected an altar to it under the name of *Aius Locutius*.

AJUTAGE, or ADJUTAGE, a kind of tube fitted to the mouth of the vessel through which the water of a fountain is to be played. To the different form and structure of ajutages is owing the great variety of fountains.

AIX, an ancient city of France, the chief place of the arrondissement of the same name, in the department of the Mouths of the Rhone. It was, before the revolution, fitted with richly endowed ecclesiastical establishments, which have been secularized. It stands on a plain surrounded by hills, which produce abundance of most excellent olives, which, with wine and fruits, form the most important branches of agricultural industry. There are manufactories of various rich silk goods, of some linen, and hardware. The ancient springs, known to the Romans, but disused till again discovered in 1704, are slightly warm, but their efficacy is not now highly valued. The population amounts to 24,000 persons. This city is celebrated for having given birth to two famous naturalists, Adanson and Tournefort, and to the painter Vanloo.

The arrondissement of the same name comprehends 864 square miles, or about 552,960 acres, and contains 10 cantons, 53 communes, and 100,000 inhabitants.

AIX, a town in the continental dominions of the king of Sardinia, in the duchy of Savoy, about 12 miles from Chambery, containing 2038 inhabitants.

AIX, a small island on the coast of France, between the isle of Oleron and the Continent. It is 12 miles north-west of Rochefort, and 11 south-south-west of Rochelle. Long. 1. 4. W. Lat. 46. 5. N.

AIX, a river of France, in the department of the Lower Loire, which joins the Ysable, and falls into the Loire.

AIX-LA-CHAPELLE (or in German AACHEN), a circle in the government of the same name, in the Prussian province of the Lower Rhine. Its extent is 1452 square miles, and it comprehends 11 cities, 16 market-towns, 798 villages, and 762 hamlets. The inhabitants amount to 354,742, of whom 300,000 adhere to the Catholic religion, and the remainder, except 1500 Jews, are Lutherans.

The chief city, of the same name, is very ancient, and was formerly populous; but the present inhabitants amount only to 37,669 persons. It was the seat of the government of Charlemagne, and continued to be the place for the coronation of the emperors of Germany till 1531. It is finely situated in a most fertile soil, and the environs are pleasing; but the city itself bears all the marks of decline. The chief objects of attention are the cathedral, with its brazen gates brought back from Paris, and a number of relics, which are highly venerated by Catholics; the town-house, built by Charlemagne, which is still in good preservation; and the baths, whose curative properties attract to them numerous visitors in the autumn of each year. Every seven years, from the 11th to the 25th of July, the holy relics are exhibited; and this has commonly drawn to the city more than 50,000 votaries.

Of late years manufactories have been introduced, which afford employment to a great number of workmen. The products are, linen and woollen goods, needles, pins, leather, snuff, Prussian blue, brass, soap, thimbles, and various small articles.

This place is remarkable as the theatre of diplomatic affairs, and for the treaties of 1668, 1748, and 1818. Long. 6. 3. E. Lat. 50. 15. N.

AIXETTE, a river in the department of Upper Vienne, in France, which empties itself into the Vienne.

AKENSIDE, MARK, a physician, who published in Latin a Treatise upon the Dysentery, in 1764, and a few pieces in the first volume of the Medical Transactions of the College of Physicians, printed in 1768; but far better known, and to be distinguished chiefly hereafter, as a poet. He was born at Newcastle-upon-Tyne, November 9. 1721; and after being educated at the grammar-school in Newcastle, was sent to the universities of Edinburgh and Leyden, at which last he took his degree of doctor in physic. He was afterwards admitted by mandamus to the same degree at Cambridge; elected a fellow of the college of physicians, and one of the physicians at St Thomas's Hospital; and, upon the establishment of the queen's household, appointed one of the physicians to her Majesty.

That Dr Akenside was able to acquire no other kind of celebrity than that of a scholar and a poet, is to be accounted for by the following particulars in his life and conduct, related by Sir John Hawkins. Mr Dyson and he were fellow-students, the one of law and the other of physic, at Leyden, where, being of congenial tempers, a friendship commenced between them that lasted through their lives. They left the university at the same time, and both settled at London. Mr Dyson took to the bar, and being possessed of a handsome fortune, supported his friend while he was endeavouring to make himself known as a physician; but in a short time, having purchased of Mr Hardinge his place of clerk of the house of commons, he quitted Westminster-hall, and, for the purpose of introducing Akenside to acquaintance in an opulent neighbourhood near the town, bought a house at North-End, Hampstead, where they dwelt together during the summer season, frequenting the long-room, and all clubs and assemblies of the inhabitants.

At these meetings, which, as they were not select, must be supposed to have consisted of such persons as usually meet for the purpose of gossiping, men of wealth, but of ordinary endowments, and able to talk of little else than news and the occurrences of the day, Akenside was for displaying those talents which had acquired him the reputation he enjoyed in other companies; but here they were of little use to him; on the contrary, they tended to engage him in disputes that betrayed him into a contempt of those who differed in opinion from him. It was found out that he was a man of low birth, and a dependent on Mr Dyson; circumstances that furnished those whom he offended with a ground of reproach, which reduced him to the necessity of asserting in terms that he was a gentleman.

Little could be done at Hampstead after matters had proceeded to this extremity. Mr Dyson parted with his villa at North-End, and settled his friend in a small house in Bloomsbury-square, assigning for his support such a part of his income as enabled him to keep a chariot. In this new situation Akenside used every endeavour to become popular, but defeated them all by the high opinion he everywhere manifested of himself, and the little condescension he showed to men of inferior endowments; by his love of political controversy, his authoritative censure of the public councils, and his peculiar notions respecting government. In the winter evenings he frequented Tom's coffee-house in Devereux-court, then the resort of some of the most eminent men for learning and ingenuity of the time, with some of whom he was involved in disputes and altercations, chiefly on subjects of literature and politics, which fixed on his character the stamp of haughtiness and self-conceit. Hence many, who admired him for his genius and parts, were shy of his acquaintance.

The value of that precept which exhorts us to live peaceably with all men, or, in other words, to avoid creating enemies, can only be estimated by the reflection on those many amiable qualities against which the neglect of it will preponderate. Akenside was a man of religion and strict virtue; a philosopher, a scholar, and a fine poet. His conversation was of the most delightful kind; learned, instructive, and, without any affectation of wit, cheerful and entertaining.

Dr Akenside died of a putrid fever, June 23. 1770; and is buried in the parish-church of St James's, Westminster.

His poems, published soon after his death in 4to and 8vo, consist of the Pleasures of Imagination, two books of Odes, a Hymn to the Naiads, and some Inscriptions. The Pleasures of Imagination, his capital work, was first published in 1744; and a very extraordinary production it was, from a man who had not reached his 23d year. He was afterwards sensible, however, that it wanted revision and correction; and he went on revising and correcting it for several years; but finding this task to grow upon his hands, and despairing of ever executing it to his own satisfaction, he abandoned the purpose of correcting, and resolved to write the poem over anew upon a somewhat different and enlarged plan. He finished two books of his new poem, a few copies of which were printed for the use of the author and certain friends; of the first book in 1757, of the second in 1765. He finished also a good part of a third book, and an introduction to a fourth; but his most munificent and excellent friend, conceiving all that is executed of the new work too inconsiderable to supply the place and supersede the republication of the original poem, and yet too valuable to be withheld from the public, has caused them both to be inserted in the collection of his poems.

AKERMAN, a circle in the Russian province of Bessarabia, extending along the banks of the Black Sea, where the Dneish forms an estuary. It is nearly destitute of population, except the capital, of the same name, which is built on a tongue of land projecting into the estuary. It is the ancient Roman colony of Alba Julia. It is surrounded with strong walls and ditches, contains a Greek and a beautiful Arminian church, several mosques, and a synagogue for Jews. The population, of various nations, religions, and languages, amounts to about 15,000. It is a place, from its position, of considerable trade. It is in long. 30. 10. 15. E. and lat. 46. 11. 45. N.

AKHMETSCHET, or SIMFEROPOL, one of the six circles into which the Russian government or province of Taurien is divided. It is the richest and most fruitful part of the peninsula, extending from long. 32. 31. to 33. 46. E. and from lat. 44. 30. to 45. 9. N. About two-thirds of the district is hilly, and gives rise to the rivers Katscha, Belbak, and Alma, as well as many smaller streams, by whose water fertility is dispersed in the valleys and plains. The circle is estimated to contain about 50,000 inhabitants.

AKHMETSCHET, a city, the capital of the circle of the same name, in the province of Taurien. It is composed of two parts; the old town, a mere heap of Tartar booths; and the new, built on a regular plan, since the extinction of the former government, with a few good public edifices. It contains three mosques, a Russian, Arminian, and Greek church, with 900 houses, and, according to Usewoloske, 20,000 inhabitants, of various nations and religions. A regiment of Russians is constantly in garrison in the city, which is only moderately fortified. It is in long. 34. 1. E. and lat. 44. 59. N.

AKHTIAR, or SEVASTOPOL, a city in the Russian government of Taurien, in the circle Akhmetschet. It lies in a bay, the best harbour of the Taurida, where the Russians have formed an arsenal for the construction and equipment of a navy. The bay is sufficiently extensive to admit of a large fleet, and the depth of water is from 10 to 12 fathoms. There are neither shoals, rocks, nor sand-banks, and vessels are secure from all winds. The inhabitants, exclusive of the garrison, amount to 1500. It is considered rather an unhealthful situation, and the water is not good. It is in long. 33. 27. 40. E. and lat. 44. 41. 30. N.

AKIBA, a famous rabbin, flourished a little after the destruction of Jerusalem by Titus. He kept the flocks of a rich citizen of Jerusalem till the 40th year of his age, and then devoted himself to study in the academies for twenty-four years; and was afterwards one of the greatest masters in Israel. According to the Jewish accounts, he had 24,000 scholars. He declared for the impostor Barcochebas, whom he owned for the Messiah; and not only anointed him king, but took upon himself the office of his master of the horse. The troops which the emperor Hadrian sent against the Jews, who under the conduct of this false Messiah had committed horrid massacres, exterminated this faction. Akiba was taken, and put to death with great cruelty. He lived 120 years, and was buried with his wife in a cave upon a mountain not far from Tiberias, and his 24,000 scholars were buried round about him upon the same mountain. It is imagined he invented a supposititious work under the name of the patriarch Abraham.

AKISSAR, the ancient Thyatira, a city of Natolia, in Asia, situated in a plain 18 miles broad, which produces plenty of cotton and grain. The inhabitants, who are reckoned to be about 5000, are said to be all Mahometans. The houses are built of nothing but earth or turf dried in the sun, and are very low and ill contrived; but there are six or seven mosques, which are all of marble. There are remarkable inscriptions on marble in several parts of the town, which are part of the ruins of the ancient Thyatira. It is seated on the river Hermus, 50 miles from Pergamos. Long. 28. 30. E. Lat. 38. 50. N.

AKOND, an officer of justice in Persia, who takes cognizance of the causes of orphans and widows, of contracts, and other civil concerns. He is the head of the school of law, and gives lectures to all the subaltern officers. He has his deputies in all the courts of the kingdom, who, with the second *sadra*, make all contracts.

AL, an Arabic particle prefixed to words, and signifying much the same with the English particle *the*. Thus they say, alkermes, alkoran, &c. *i. e.* the kermes, the koran, &c.

Al, or Ald, a Saxon term, frequently prefixed to the names of places, denoting their antiquity; as, Aldborough, Aldgate, &c.

ALA, a Latin term, properly signifying a wing; from a resemblance to which several other things are called by the same name. Thus,

Ala is a term used by botanists for the hollow of a stalk, which either the leaf or the pedicle of the leaf makes with it; or it is that hollow turning, or sinus, placed between the stalk or branch of a plant and the leaf, whence a new offspring usually issues. Sometimes it is used for those parts of leaves otherwise called *lobes* or *wings*.

ALÆ, the plural number, is used to signify those petals or leaves of papilionaceous flowers placed between those others which are called the *vexillum* and *carina*, and which make the top and bottom of the flowers. Instances of flowers of this structure are seen in those of peas and beans, in which the top leaf or petal is the vexillum, the bottom the carina, and the side ones the alæ.

Alæ is also used for those extremely slender and membranaceous parts of some seeds which appear as wings placed on them. It likewise signifies those membranaceous expansions running along the stems of some plants, which are therefore called *alated stalks*.

Alæ, in *Anatomy*, a term applied to the lobes of the liver, the cartilages of the nostrils, &c.

Alæ, in the *Roman Art of War*, were the two wings or extreme parts of the army drawn up in order of battle.

ALABA, one of the three smallest districts of Biscay, in Spain, but pretty fertile in rye, barley, and fruits. There are in it very good mines of iron, and it had formerly the title of a kingdom.

ALABAMA, a state and constituent member of the North American republic. It is bounded by Florida and the Gulf of Mexico on the south, the state of Mississippi on the west, Tennessee on the north, and Georgia on the east. Its length is 275 miles, breadth 185, and area 50,800 square miles. The country, to the extent of more than 100 miles from the coast, consists of uneven lands, of a poor sandy soil, bearing little except pines, but interspersed with marshes and alluvial tracts on the sides of the streams, which are extremely fertile. Higher up, the country becomes fertile and beautiful, and it bears that aspect as far as the mountains occupying the northern part of the state. These mountains are about 50 miles in breadth, and are supposed to exceed 1500 feet in height, but have peaks rising much higher. They are covered with a stony soil, but on their southern side are many rich and beautiful valleys, clothed with forests of oak, hickery, walnut, gum, and maple. Under the surface are mines of iron-ore. The climate is very hot in the parts below the latitude of 32½, but comparatively temperate in the upper districts. At Fort Stodart, in latitude 31. the mean heat by day was 84° or 86° in July, and from 43° to 79° in February. The principal river in the state is the Alabama, which is formed of two branches, the Tombeckbee, and the proper Alabama. The former rises in the state of Mississippi, and after being joined by several streams, joins the Alabama at Fort Stodart. The Coosa and Talapoosa rivers united, compose the proper Alabama, which, after being joined by the Tombeckbee, falls into the Gulf of Mobile at the latitude of 30½. All these rivers are navigable to a great distance from the sea. Steam-boats ply on the Alabama as far up as Montgomery, which is nearly 400 miles by water from Mobile Bay, but only 150 by land. The great employment of the people is agriculture. The soil yields wheat, maize, rye, barley, oats, and rice, and sugar-canes; but the principal object of culture is cotton, of which the state exports large quantities. The cotton crop for 1836 in North Alabama was 80,000 bales; and in South Alabama 250,000 bales. The number of inhabitants in 1820 was 127,901, of whom 41,859 were slaves, and 571 free blacks. In January 1828 it was estimated at 254,000, including 93,000 slaves. This is exclusive of the Creek Indians, who were estimated at 20,000 in 1818. The population in 1830 amounted to 309,527, the great increase being in emigrants from Georgia. Cahawba, a small place, is the seat of government; but the only considerable town in the state is Mobile, which is situated on the west side of the bay of the same name, 30 miles from the Gulf of Mexico, and in 1826 contained 5000 inhabitants. In 1816 some exiles from France received a grant of lands on the banks of the Tombeckbee, in this state, with the view of introducing the culture of the vine; but the project did not succeed, and the new settlement, named Demopolis, was abandoned in a few years. Alabama has very few made roads, and few canals, but by means of its numerous rivers it enjoys a great extent of inland navigation; and Mobile, the great centre of its trade, now communicates by steam-boats with all the considerable places on the Tombeckbee and Alabama rivers, and by sea with New Orleans. Alabama was admitted to the rank of a state and member of the American union in 1819. Its government is vested in a house of representatives elected annually, a senate elected triennially and renewed by thirds, and a governor elected for two years. The right of suffrage belongs to every white citizen of full age. The judges in this state hold their offices for six or seven years. Owing to the thinness of the population, education is yet in a backward state; but as a fund for its promotion, 640 acres of land are set apart in each township. In 1827 the public revenue amounted to 67,000 dollars, and the expenditure to 82,000. The country is healthful, except in the neighbourhood of wet grounds; and, upon the whole, Alabama possesses advantages over some of the other southern states, and is one of the most prosperous and rapidly progressive in that part of the union. (P.)

ALABARCHA, in *Antiquity*, a kind of magistrate among the Jews of Alexandria, whom the emperor allowed them to elect, for the superintendency of their policy, and to decide differences and disputes which arose among them.

ALABASTER, William, an English divine, was born at Hadley, in the county of Suffolk. He was one of the doctors of Trinity College in Cambridge; and he attended the earl of Essex as his chaplain in the expedition to Cadiz in the reign of Queen Elizabeth. It is said that his first resolutions of changing his religion were occasioned by his seeing the pomp of the churches of the Roman communion, and the respect with which the priests seemed to be treated amongst them; and appearing thus to waver in his mind, he soon found persons who took advantage of this disposition of his, and of the complaints which he made of not being advanced according to his deserts in England, in such a manner, that he did not scruple to go over to the Popish religion, as soon as he found that there was no ground to hope for greater encouragement in his own country. However that matter be, he joined himself to the Romish communion; but was disappointed in his expectations. He was soon displeased at this; and he could not reconcile himself to the discipline of that church, which made no consideration of the degrees which he had taken before. It is probable, too, that he could not approve of the worship of creatures, which Protestants are used to look upon with horror. Upon this he returned to England in order to resume his former religion. He obtained a prebend in the cathedral of St Paul, and after that the rectory of Therfield in Hertfordshire. He was well skilled in the Hebrew tongue; but he gave a wrong turn to his genius by studying the Cabala, with which he was strangely infatuated. He gave a proof of this in a sermon which he preached upon taking his degree of doctor of divinity at Cambridge. He took for his text the beginning of the first book of Chronicles, "Adam, Seth, Enos;" and having touched upon the literal sense, he turned immediately to the mystical, asserting, that Adam signified misfortune and misery, and so of the rest. His verses were greatly esteemed. He wrote a Latin tragedy, entitled *Roxana*, which, when it was acted in a college at Cambridge, was attended with a very remarkable accident. There was a lady who was so terrified at the last word of the tragedy, *Sequar, Sequar*, which was pronounced with a very shocking tone, that she lost her senses all her lifetime after. He died in the year 1640. His *Apparatus in Revelationem Jesu Christi* was printed at Antwerp in 1607. His *Spiraculum Tubarum, seu Fons Spiritualium Expositionum ex æquivocis Pentaglotti significationibus*, and his *Ecce Sponsus venit, seu Tuba Pulchritudinis, hoc est, Demonstratio quod non sit illicitum nec impossibile computare durationem mundi et tempus secundi adventus Christi*, were printed at London. From these titles we may judge what were the taste and genius of the author.

ALABASTER, in *Natural History*, a mineral substance whose base is calcareous earth. It differs from marble in being combined, not with the carbonic, but with the sulphuric acid.

ALABASTER, in *Antiquity*, a term used for a vase wherein odoriferous liquors were anciently put. The reason of the denomination is, that vessels for this purpose were frequently made of the alabaster stone, which Pliny and other ancients represent as peculiarly proper for this purpose. Several critics will have the box mentioned in the Gospels as made of alabaster to have been of glass; and though the texts say that the woman broke it, yet the pieces seem miraculously to have been united, since we are told the entire box was purchased by the emperor Constantine, and preserved as a relic of great price. Others will have it that the name *alabaster* denotes the form rather than the matter of this box: in this view they define alabaster by a box without a handle, deriving the word from the privative α, and λαβη, *ansa, handle*.

ALABASTER is also said to have been used for an ancient liquid measure, containing ten ounces of wine, or nine of oil. In this sense the alabaster was equal to half the sextary.

ALABASTRUM DENDROIDE, a kind of laminated alabaster, beautifully variegated with the figures of shrubs, trees, &c. found in great abundance in the province of Hohenstein.

ALADINISTS, a sect among the Mahometans, answering to freethinkers among us.

ALADSCHAHISSAR, a Turkish pachalic (Sandschah), part of the ancient Bulgaria, a mountainous district, in which the river Moravia rises in two branches, and runs into the Danube. It extends from long. 21. 45. to 22. 30. E. and from lat. 42. 30. to 43. 30. N. The great road from Belgrade passes through the northern part of the province. It is productive of wine, feeds much cattle, and has some rivers near Camplina. The capital, of the same name, sometimes called Kruschevarz, is the seat of a Greek bishop, and has a castle; once the residence of the predatory chief Von Serf, and conquered from him by the Sultan Murad the Second. It is near the east bank of the river Moravia.

ALADULIA, a considerable province of Turkey in Asia, in that part called Natolia, between the mountains of Antitaurus, which separate it from Amasia on the north, and from Caramania on the west. It has the Mediterranean Sea on the south; and the Euphrates or Frat on the east, which divides it from Diarbekir. It comprehends the Lesser Armenia of the ancients, and the east part of Cilicia. Formerly it had kings of its own; but the head of the last king was cut off by Selim I. emperor of the Turks, who had conquered the country. It is now divided into two parts: the north, comprehended between Taurus, Antitaurus, and the Euphrates, is a beglerbeglic, which bears the name of Marash, the capital town; and the south, seated between Mount Taurus and the Mediterranean, is united to the beglerbeglic of Aleppo. The country is rough, rugged, and mountainous; yet there are good pastures, and plenty of horses and camels. The people are hardy and thievish. The capital is Malatigah.

ALAIN, CHARTIER, secretary to Charles VII. king of France, born in the year 1386. He was the author of several works in prose and verse; but his most famous performance was his Chronicle of King Charles VII. Bernard de Girard, in his preface to the History of France, styles him "an excellent historian, who has given an account of all the affairs, particulars, ceremonies, speeches, answers, and circumstances, at which he was present himself, or had information of." Giles Coroxet tells us that Margaret, daughter to the king of Scotland, and wife to the dauphin, passing once through a hall where Alain lay asleep, she stopped and kissed him before all the company who attended. Some of them telling her, that it was strange she should kiss a man who had so few charms in his person, she replied, "I did not kiss the man, but the mouth from whence proceed so many excellent sayings, so many wise discourses, and so many elegant expressions." Mr Fontenelle, among his Dialogues of the Dead, has one upon this incident, between the princess Margaret and Plato. Mr Pasquier compares Alain to Seneca, on account of the great number of beautiful sentences interspersed throughout his writings.

ALAJOR, a Spanish town, in the island of Minorca, and the province of Majorca, the chief town of a district containing 3950 inhabitants.

ALAIS, an arrondissement in the department of the Gard, in France, extending over 480 square miles, or 307,200 acres. It is divided into nine cantons, and ninety-two communes, and contains 72,000 inhabitants.

ALAIS, a city, and chief of the arrondissement of the same name. It is situated on the river Gardon, at the foot of the Cevennes. It contains 10,000 inhabitants, who are employed in manufacturing ribbons, sewing-silk, silk-hosiery, cotton-goods, glass, porcelain, and other articles. Long. 3. 29. 40. E. Lat. 44. 7. N.

ALAMAGAN, one of the Ladrone or Marianne islands, in the Indian Ocean, is situated in long. 146. 47. E. lat. 18. 5. N. It is of an irregular form, and about 12 miles in circumference. The land in some places of this island is pretty high, so that it may be seen at the distance of 12 or 14 leagues. Near the north end of the island there is a volcano, which emitted an immense body of smoke in the year 1799, when it was visited by Captain Bass. The volcano is in a mountain close to the sea, rising above its level 1200 or 1500 feet. The high parts of the island are rugged and sterile. In the lower parts there is a profusion and luxuriance of vegetation. They abound with cocoa-nut trees, several kinds of stone-fruit, and the mellora or bread-tree of the Nicobar islands. Some small sugar-canes, some banana trees, and one bread-fruit tree, were discovered. Lizards, land-crabs, large partridges, quails, pigeons, owls, thrushes, and bullfinches, are numerous. But no fresh water, which was the object of Captain Bass's visit, could be found.

ALAMANDUS, Lewis, in French *Aleman*, archbishop of Arles, and cardinal of St Cecilia, was one of the greatest men of the 15th century. The cardinal presided in the council of Basil, which deposed Eugenius IV. and elected the antipope Felix V. He is much commended by Æneas Sylvius, as a man extremely well formed for presiding in such assemblies,—firm and vigorous, illustrious by his virtue, learned, and of an admirable memory in recapitulating all that the orators and disputants had said. At the request of the canons and Celestine monks of Avignon, and the solicitation of the cardinal of Clermont, legate *a latere* of Clement VII., he was beatified by the pope in the year 1527.

ALAMANNI, Lewis, was born at Florence, of a noble family, on the 28th of October 1495. He was obliged to fly his country for a conspiracy against Julius de' Medici, who was soon after chosen pope under the name of Clement VII. During this voluntary banishment he went into France, where Francis I., from a love to his genius and merit, became his patron. This prince employed him in several important affairs, and honoured him with the collar of the order of St Michael. After the death of Francis, Henry, duke of Orleans, who succeeded him in 1537, showed no less favour to Alamanni, and in the year 1551 sent him as his ambassador to Genoa. This was his last journey to Italy; and being returned to France, he died at Amboise on the 18th of April 1556, being in the 61st year of his age. He left many beautiful poems, and other valuable performances, in the Italian language. We have also some notes of his upon Homer's Iliad and Odyssey: those upon the Iliad were printed in the Cambridge edition of Homer in 1689, and Joshua Barnes has also inserted them in his fine edition of Homer in 1711.

ALAMODALITY, in a general sense, is the accommodating of a person's behaviour, dress, and actions, to the prevailing taste of the country or times in which he lives.

Alamodality of writing is defined, the accommodation of mental productions, both as to the choice of subject and the manner of treating it, to the genius or taste of the times, in order to render them more acceptable to the reader.

ALAMODE, a phrase originally French, importing a thing to be in the fashion or mode. The phrase has been adopted not only into several of the living languages, as the English and High Dutch, but some have even taken it into the Latin. Hence we meet with *Alamodicus* and *Alamodalitas*.

Alamode, in *Commerce*, a thin, glossy, black silk, chiefly used for women's hoods and men's mourning scarfs.

ALAMOS, Balthasar, a Spanish writer, born at Medina del Campo, in Castile. After having studied the law at Salamanca, he entered into the service of Anthony Perez, secretary of state under Philip II. He was in high esteem and confidence with his master, upon which account he was imprisoned after the disgrace of this minister. He was kept in confinement 11 years, when Philip III. coming to the throne, set him at liberty, according to the orders given by his father in his will. Alamos continued in a private capacity till the duke of Olivarez, the favourite of Philip IV., called him to public employments. He was a man of wit as well as judgment, but his pen was superior to his tongue. He died in the 88th year of his age. His Spanish translation of Tacitus, and the aphorisms which he added in the margin, gained him great reputation. This work was published at Madrid in 1614, and was to have been followed, as mentioned in the king's privilege, with a commentary, which, however, has never yet appeared. The author composed the whole during his imprisonment.

ALAN, Cardinal William, was born at Rossal, in Lancashire, in the year 1532. He went to Oxford at the age of 15, and in 1550 was elected fellow of Oriel College. In 1556, being then only 24 years old, he was chosen principal of St Mary's Hall, and one of the proctors of the university. In 1558 he was made canon of York; but, upon Queen Elizabeth's accession to the throne, he left England, and settled at Louvaine, in an English college, of which he became the chief support. In 1565 he visited his native country; but on account of his extreme activity in the propagation of the Roman Catholic religion, he was obliged to fly the kingdom in 1568. He went first to Mechlin, and then to Douay, where he was made doctor of divinity. Soon after he was appointed canon of Cambray, and then canon of Rheims. He was created cardinal on the 28th of July 1587, by the title of *St Martin in Montibus*, and obtained from the king of Spain a rich abbey in the kingdom of Naples, and afterwards the bishopric of Mechlin. It is supposed to have been by the advice and instigation of this priest that Philip II. attempted to invade England. He died on the 20th of October 1594, aged 63, and was buried in the English college at Rome. He was a man of considerable learning, and an elegant writer. He wrote many books in defence of the Romish religion. The most remarkable are, 1. *A Defence of the Twelve Martyrs in one Year*. Tho. Alfield was hanged for bringing into England and publishing this and others of Alan's works, in the year 1584. 2. *A Declaration of the Sentence of Sextus V.* &c.; a work intended to explain the pope's bull for the excommunication of Queen Elizabeth, and to exhort the people of England to take up arms in favour of the Spaniards. Many thousand copies of this book, printed at Antwerp, were put on board the Armada; but the enterprise failing, they were afterwards destroyed. 3. *Of the Worship due to Saints and their Relics*, 1583. This treatise was answered by Lord Burleigh, and is esteemed the most elegant of the cardinal's writings.

ALAND, a barony comprehending the island of that name, and the several other islands around it, at the point where the Baltic Sea divides into the Gulf of Bothnia and of Finland. The group consists of more than 80 inhabited and 200 uninhabited islands. Although the principal island is nearer to Sweden than to Finland, the whole were included with the cession of the latter country to Russia. The inhabitants are 13,340, without a city, and scarcely any place deserving the description of a town.

Aland, the chief island of a group on the border of Sweden, separated from it by the Straits of Alandshaf. It is in part covered with wood, but has some arable and more pasture land. On the hills goats are reared; in the valleys sheep and cows. The shores are visited by shoals of fish, the catching and preserving of which forms the chief employment of the inhabitants. The island is about 40 miles long and 35 broad.

ALAR del Rey, a town of Spain, in the province of

Burgos, in Old Castile. It is the commencement of the canal of Castile, on the river Pisuerga, in a cold and barren district. Lat. 42. 51. N.

ALARAF, in the *Mahometan Theology*, the partition wall that separates heaven from hell. The word is plural, and properly written *al araf*; in the singular it is written *al arf*. It is derived from the Arabic verb *arafa*, to distinguish. Alaraf gives the denomination to the seventh chapter of the Alcoran, wherein mention is made of this wall. Mahomet seems to have copied his Alaraf either from the great gulf of separation mentioned in the New Testament, or from the Jewish writers, who also speak of a thin wall dividing heaven from hell. Mahometan writers differ extremely as to the persons who are to be found on Alaraf. Some take it for a sort of limbus for the patriarchs, prophets, &c.; others place here such whose good and evil works so exactly balance each other that they deserve neither reward nor punishment; others imagine this intermediate space to be possessed by those who, going to war without their parents' leave, and suffering martyrdom there, are excluded paradise for their disobedience, yet escape hell because they are martyrs.

ALARBES, a name given to those Arabians who live in tents, and distinguish themselves by their dress from the others who live in towns.

ALARES, in *Roman Antiquity*, an epithet given to the cavalry on account of their being placed in the two wings of the army.

ALARIC, a famous general of the Goths. He entered Thrace at the head of 200,000 men, and laid waste all the country through which he passed. He marched next to Macedonia and Thessaly. The Thessalians met him near the mouth of the river Peneus, and killed about 3000 of his army; nevertheless he advanced into Greece, and after having ravaged the whole country, returned to Epirus loaded with immense spoils. After staying here five years, he resolved to turn his arms to the west. He marched through Pannonia, and, finding little resistance, entered Italy, in the consulship of Stilicho and Aurelianus, A. D. 400. After various battles and treaties, he at last took Rome by treachery, and permitted his soldiers to plunder it: this happened A. D. 400. Alaric, having laid waste a great part of Italy, intended to pass into Sicily; but a storm obliging him to land again, he besieged the city of Cosenza; and, having taken it, he died there in 411, eleven years after he first entered Italy.

ALARM, in the military art, denotes either the apprehension of being suddenly attacked, or the notice thereof signified by firing a cannon, firelock, or the like. False alarms are frequently made use of to harass the enemy, by keeping them constantly under arms. Sometimes also this method is taken to try the vigilance of the picquet-guard, and what might be expected from them in case of real danger.

Alarm-Bell, that rung upon any sudden emergency, as a fire, mutiny, or the like.

Alarm, in fencing, is the same with what is otherwise called an appeal or challenge.

ALASCANI, in *Church History*, a sect of Anti-Lutherans, whose distinguishing tenet, besides their denying baptism, is said to have been this, that the words, *This is my body*, in the institution of the eucharist, are not to be understood of the bread, but of the whole action or celebration of the Supper. They are said to have taken the name from one Joannes Alasco, a Polish baron, superintendent of the church of that country in England. See the next article.

ALASCO, John, a Polish nobleman of the 16th century, who, imbibing the reformed opinions, was expelled his country, and became preacher to a Protestant congregation at Embden; but foreseeing persecution there, he came to England about the year 1551, while the reformation was carrying on under Edward VI. The publication of the *Interim* driving the Protestants to such places as afforded them toleration, 380 were naturalized here, and obtained a charter of incorporation, by which they were erected into an ecclesiastical establishment, independent on the church of England. The Augustine friars church was granted them, with the revenues, for the maintenance of Alasco as superintendent, with four assistant ministers, who were to be approved of by the king; and this congregation lived undisturbed until the accession of Queen Mary, when they were all sent away. They were kindly received, and permitted to settle at Embden; and Alasco at last, after an absence of 20 years, by the favour of Sigismund, returned to his own country, where he died in 1560. Alasco was much esteemed by Erasmus, and the historians of his time speak greatly in his praise. We have of his writing, *De Cœna Domini liber; Epistola continens Summam controversiæ de Cœna Domini, &c.* He had some particular tenets; and his followers are called *Alascani* in church history.

ALASSIO, a seaport in the duchy of Genoa, in the Sardinian kingdom, with 1420 inhabitants, who equip several vessels annually to the coral fishery on the shores of the island of Sardinia.

ALASSONA, a town in European Turkey, with 3000 inhabitants. It is in the ancient Thessaly, now in the pachalic of Tirhala. A great fair is held here.

ALATAMAHA, a large river of North America, which, rising in the Apalachian mountains, runs south-east through the province of Georgia, and falls into the Atlantic Ocean, below the town of Frederica.

ALAVA, a province in the north of Spain, one of those three usually denominated Provincias Vascongadas, which enjoy privileges that distinguish them from the other dominions of the Spanish monarchy, and speak a language most remote from the Castilian, generally called by the natives Vascuence, and by other people the Basque. This province is of a triangular shape, bounded on the north by Guipuscoa and Biscay, on the east by Navarre, on the south and south-west by Rioja, from which it is divided by the river Ebro, and on the west by the northern part of Old Castile. The square extent of this province is 90¼ leagues; and the population, by the census of 1803, amounted to 67,523 souls, giving a density of inhabitants somewhat exceeding the general average of Spain.

The surface of the province is very mountainous, and is abundantly clothed with woods and lofty trees. Its valleys are fertile. The soil yields more corn than the subsistence of its inhabitants requires, as well as flax, hemp, some oil, and a kind of wine called chacoli, which, though it is drunk when new, will not long retain its qualities. The mountains abound in iron-ore, and there were once extensive manufactories of iron goods, though they have of late decreased, owing to the privileges of these provinces exempting them from all taxation, in consequence of which their productions are charged with heavy imposts on their introduction into Castile. There are numerous weavers of coarse cloths and blankets over the whole province. Shoes and hats are manufactured; but these articles, like the iron ware, have experienced a sensible declension of late years. The capital of the province is Vittoria, situated on the river Zadora, which empties itself into the Ebro. The other rivers are the Ayuda, which runs into the Zadora; and the Omecillo, which empties itself into the Ebro.

ALAUTA, a considerable river of Turkey in Europe, which, after watering the north-east part of Transylvania and part of Wallachia, falls into the Danube almost opposite to Nicopolis.

ALAY, signifying in the Turkish language "The Triumph," a ceremony which accompanies the assembling together the forces of that vast empire upon the breaking out of a war. It consists of the most insipid buffoonery, and is attended with acts of the most shocking barbarity.

ALAYOR, a town of Spain, in the district of the same name, the former containing 900, the latter 3960 inhabitants. It is in the island of Minorca, belonging to the Spanish crown.

ALB, or ALBE, in the *Romish Church*, a vestment of white linen hanging down to the feet, and answering to the surplice of the English clergy. In the ancient church it was usual with those newly baptized to wear an alb, or white vestment; and hence the Sunday after Easter was called *dominica in albis*, on account of the albs worn by the baptized on Easter-day.

ALB is also a name of a Turkish coin, otherwise called *asper*.

ALBA, a province in the duchy of Piedmont, in the continental Sardinian dominions. It is a fine plain of 366 square miles, or 234,240 acres, producing abundant harvests of corn, wine, fruits, oil, and truffles, besides the best silk. The cattle are not numerous. There are no mines, but quarries of marble, slate, and rock-salt. The inhabitants amount to 94,965, living in 2 cities and 75 towns and villages. There is scarcely any demand for labour, but that which the agriculture requires.

ALBA, a city of Italy, capital of the province of the same name, in Piedmont. It is situated on the river Tanaro, between Asti and Chevasco; is the seat of a bishop, and contains, besides the cathedral, six churches and seven religious establishments for the two sexes of ecclesiastics. The population is 6990 persons. Long. 8. 3. E. Lat. 44. 36. N.

ALBA Firma, or *Album*, in our old customs, denoted rent paid in silver, and not in corn, which was called *black mail.*

ALBA Terra, one of the numerous names for the philosopher's stone.

ALBA Longa, in *Ancient Geography*, a colony from Lavinium, in Latium, 15 miles south-east from Rome, established by Ascanius, the son of Æneas, at the foot of the Mons Albanus. It was called *Alba*, from a white sow found by Æneas, which farrowed 30 white pigs on that spot; which circumstance was interpreted to portend the building of a city there in 30 years after (Propertius). The epithet *Longa* was added on account of its length. It was the royal residence till the building of Rome, as was foretold by Anchises (Virgil); was destroyed by Tullus Hostilius, all but the fane or temple; and the inhabitants were transplanted to Rome (Strabo).

ALBACETE, a Spanish town in the province of Murcia. It has 1 parish church, 5 monasteries, 1 hospital, and 5200 inhabitants. There are looms for weaving cloth, 28 manufactories of cutlery, a famous fair held in September, and excellent wine here. Long. 2. 2. W. Lat. 38. 51. N.

ALBAHURIM, *figura sexdecim laterum*, a figure of great importance, according to astrological physicians, who built their prognostics on it.

ALBAIDA, a Spanish town in the province of Valencia, containing 3200 inhabitants. There are linen manufactories, bleaching, and soap-boiling carried on here.

ALBAN, a town of 3070 inhabitants, in the arrondissement of Alby, and department of Herault, in France, near to which is a rich iron-mine.

ALBAN, ST, is said to have been the first person who suffered martyrdom for Christianity in Britain; he is therefore usually styled the protomartyr of this island. He was born at Verulam, and flourished towards the end of the third century. In his youth he took a journey to Rome, in company with Amphibalus, a monk of Caerleon, and served seven years as a soldier under the emperor Dioclesian. At his return home he settled at Verulam, and, through the example and instructions of Amphibalus, renounced the errors of Paganism, in which he had been educated, and became a convert to the Christian religion. It is generally agreed that Alban suffered martyrdom during the great persecution under the reign of Dioclesian; but authors differ as to the year when it happened. Bede and others fix it in 286; some refer it to the year 296; but Usher reckons it amongst the events of 303. The story and circumstances relating to his martyrdom, according to Bede, are as follows:—Being yet a Pagan (or at least it not being known that he was a Christian), he entertained Amphibalus in his house. The Roman governor being informed thereof, sent a party of soldiers to apprehend Amphibalus; but Alban, putting on the habit of his guest, presented himself in his stead, and was carried before that magistrate. The governor having asked him of what family he was, Alban replied, "To what purpose do you inquire of my family? if you would know my religion, I am a Christian." Then being asked his name, he answered, "My name is Alban, and I worship the only true and living God, who created all things." The magistrate replied, "If you would enjoy the happiness of eternal life, delay not to sacrifice to the great gods." Alban answered, "The sacrifices you offer are made to devils; neither can they help the needy, nor grant the petitions of their votaries." His behaviour so enraged the governor, that he ordered him immediately to be beheaded. In his way to execution he was stopped by a river, over which was a bridge so thronged with spectators that it was impossible to cross it. The saint, as we are told, lifted up his eyes to heaven, and the stream was miraculously divided, and afforded a passage for himself and a thousand more persons. Bede does not indeed give us the name of this river; but, notwithstanding this omission, the miracle, we suppose, will not be the less believed. This wonderful event converted the executioner upon the spot, who threw away his drawn sword, and, falling at St Alban's feet, desired he might have the honour to die with him. This sudden conversion of the headsman occasioning a delay in the execution till another person could be got to perform the office, St Alban walked up to a neighbouring hill, where he prayed for water to quench his thirst, and a fountain of water sprung up under his feet: here he was beheaded on the 23d of June. The executioner is said to have been a signal example of divine vengeance; for as soon as he gave the fatal stroke, his eyes dropped out of his head. We may see the opinion of Milton in regard to this narrative, in his *History of England.* His words are these, speaking of St Alban: "The story of whose martyrdom, soiled and worse martyred with the fabling zeal of some idle fancies, more fond of miracles than apprehensive of the truth, deserves no longer digression." Between 400 and 500 years after St Alban's death, Offa, king of the Mercians, built a large and stately monastery to his memory; and the town of St Albans, in Hertfordshire, takes its name from our protomartyr.

ALBANENSES, in *Church History*, the same with Albigenses. See ALBIGENSES.

ALBANI, in *Roman Antiquity*, a college of the *Salii*, or priests of Mars; so called from Mount Albanus, the place of their residence.

ALBANI, *Francis*, a celebrated painter, born in Bologna, March 17. 1578. His father was a silk merchant, and intended to bring up his son to that business; but Albani, having a strong inclination to painting, when his father died, devoted himself entirely to that art, though then but twelve years of age. He first studied under Denys Calvert, Guido Reni being at the same time under this master, with whom Albani contracted a very great friendship. Calvert drew but one profile for Albani, and afterwards left him entirely to the care of Guido, under whom he made great improvement, his fellow-disciple instructing him with the utmost humanity and good-humour. He followed Guido to the school of the Caracci; but a little after, their friendship for each other began to cool, which was owing perhaps to the pride of Albani, who could not bear to see Guido surpass him, or to the jealousy of Guido at finding Albani make such rapid progress. They certainly endeavoured to eclipse one another; for when Guido had set up a beautiful altar-piece, Albani would oppose to it some fine picture of his. Thus did they behave for some time, and yet spoke of each other with the highest esteem. Albani, after having greatly improved himself under the Caracci, went to Rome, where he continued many years, and married in that city; but his wife dying in childbed, at the earnest request of his relations he returned to Bologna, where he entered again into the state of matrimony. His second wife (Doralice) was well descended, but had very little fortune; which he perfectly disregarded, so strongly was he captivated with her beauty and good sense. Albani, besides the satisfaction of possessing an accomplished wife, reaped likewise the advantage of having a most beautiful model; so that he had now no occasion to make use of any other woman to paint a Venus, the Graces, Nymphs, and other deities, whom he took a particular delight in representing. His wife answered this purpose admirably well; for besides her bloom of youth, and the beauty of her person, he discovered in her so much modesty, so many graces and perfections, so well adapted to painting, that it was impossible for him to meet with a more finished woman. She afterwards brought him several boys, all extremely beautiful and finely proportioned; so that she and her children were the originals of his most agreeable and graceful compositions. Doralice was so conformable to his intentions, that she took a pleasure in setting the children in different attitudes, holding them naked, and sometimes suspended by strings, when Albani would draw them in a thousand different ways. It was from them, too, that the famous sculptors Flamand and Argaldi modelled their little Cupids.

Albani was of a happy temper and disposition; his paintings, says Malvasia, breathing nothing but content and joy. Happy in a force of mind that conquered every uneasiness, his poetical pencil carried him through the most agreeable gardens to Paphos and Cythera; those delightful scenes brought him over the lofty Parnassus to the delicious abodes of Apollo and the Muses: whence what Du Fresnoy says of the famous Giulio Romano may be justly applied to Albani:—

> Taught from a child in the bright Muses' grots,
> He open'd all the treasures of Parnassus,
> And in the lively poetry of painting
> The myst'ries of Apollo has reveal'd.

He died the 4th of October 1660, to the great grief of all his friends and the whole city of Bologna. Malvasia has preserved some verses of Francisco de Lemene, intended for his monument; the sense whereof is, "that the mortal remains of the illustrious Albani, he who gave life to shade, lie interred in this tomb. The earth never produced so wonderful an artist, nor a hand equal to his immortal one, which gave colour to the soul, and a soul to colours. Prometheus animated clay, and gave life by means of the sun; but Albani animated merely by the assistance of shade." He was very famous in his lifetime, and had been visited by the greatest painters. Several princes honoured him with letters; and amongst the rest King Charles I., who invited him to England by a letter signed with his own hand.

ALBANIA, a country of considerable extent, which, though frequently ruled by turbulent and nearly independent chiefs, ranks as one of the provinces of the Turkish empire. It extends from the thirty-ninth to the forty-third degree of north latitude, for the space of about 250 miles, along the Mediterranean and the Gulf of Venice. The extent inland nowhere exceeds 100 miles, and is in the southern part not more than 30. The chain of Pindus, called now the mountains of Sagori, of Metzovo, and of Suli, separate it by an ill-defined line from Macedonia and Thessaly. The Turks divided it into pachalics, of which the principal are those of Scutari, Ochrida, Vallona, and Butrinto; but these distinctions, amid late revolutions, have been in a great measure obliterated. The divisions chiefly recognised are those formed by the varieties of the native tribes. Major Leake, who is allowed to be the best informed traveller on this head, divides them into the Ngege, or Ghegides, whose principal towns are Dulcigno, Scutari, and Durazzo; the Toske or Toskides, who occupy Berat and Elbasan; the Liape, a poor and predatory race, who inhabit the mountains between the Toske and Delvino; and the Tsami, who inhabit the most southerly district, and whose principal towns are Suli and Paramithia. There are, besides, a great number of smaller divisions, too tedious to enumerate. (Leake's *Researches in Greece.*)

Albania nearly coincides with the country known to the ancients under the name of Epirus. This country was then, as now, distinguished by the rude valour of its inhabitants. Its remote situation, and the want of union among its tribes, generally prevented it from acting any conspicuous part in Grecian politics. The only remarkable exception occurs in the reign of Pyrrhus II., who was justly ranked with the greatest captains of antiquity. After his death the country was again split into a number of petty states, which were unable to resist the united strength of Macedon; and to that kingdom Epirus continued subject, till both were alike subdued by the Roman arms.

It was during the time of the Greek empire that the name of Albania was first given to this district. During the decline of the empire the Albanians gradually rose to distinction, and at last to independence. Their valour enabled them to maintain their ground against the Bulgarians, who had occupied all the neighbouring districts of Greece. Nor were they less successful against the Turks, a more formidable enemy. Under the command of the celebrated George Castriot, commonly called Scanderbeg, they baffled all the efforts of Mahomet II. the conqueror of Constantinople. That powerful monarch entered Albania only to experience a succession of defeats, and was at length compelled to acknowledge its independence by a formal treaty. On the death of Scanderbeg the Turks redoubled their efforts against Albania, which was at length reduced to a state of nominal subjection. The siege of Scutari, in 1478, formed the termination of this memorable struggle. The subjection, however, was always imperfect; revolts were frequent, and the inhabitants of the mountainous districts still preserved their independence. It was by the motives of pay and plunder, rather than by compulsion, that these hardy soldiers were allured into the Turkish ranks. In proportion as the Ottoman empire declined in vigour, its hold of Albania became less firm; and the vigorous and enterprising genius of Ali Pacha again converted this dependency into what might almost be called a separate kingdom.

Ali was born at Tepellene, a small town in the interior of Albania. His father held the rank of a pacha of two tails, but was not possessed of any extensive power; and he died when Ali was only fifteen. In a district so turbulent, and filled with warlike and hostile leaders, the young chief was necessarily placed in a very critical situation. He was himself accustomed to boast, that he began his fortune with sixty paras and a musket; and an Albanian who attended a late traveller (Mr Hobhouse) declared, that he remembered to have seen Ali with his jacket out at elbows. Ali was ere long driven from Tepellene, his native place, and was abandoned by almost every follower. A plan was next formed for his destruction, by the inhabitants of Gardiki, a neighbouring town; and for this purpose they surrounded, in the night-time, a village where he had taken refuge. Ali escaped through a garden, but his mother and sister fell into the hands of the Gardikiotes, and were treated with every species of indignity; wrongs for which he afterwards took a dreadful vengeance. His address and activity enabled him gradually to repair his fortunes. He insinuated himself into the favour of Coul Pacha, then the principal chief of Albania, whose daughter he at length married. Having thus been enabled to collect some followers, he succeeded in surprising Yanina, the capital, and in prevailing upon the Porte to recognise him as pacha of that important district. From this time he took the lead among the Albanian chiefs; employing sometimes force, sometimes money, and sometimes treachery, to increase his authority, and add to the extent of his dominions.

The most formidable adversaries with whom Ali had to contend were the Suliotes, a people placed in the southern extremity of Albania. They inhabit an almost inaccessible range of mountains, beneath whose gloomy shade winds a river, which Dr Holland conjectures, on very plausible grounds, to be the Acheron of the ancients. (*Travels in the Ionian Isles and Albania.*) The strength of their native bulwarks, their passion for war, and contempt of death, made them the terror of Albania, which they frequently invaded; while no foreign power had ever ventured to scale the tremendous barriers by which they were guarded. Ali at length succeeded, partly by force and partly by bribery, in gaining the passes which led into their country; and the whole nation, after a furious resistance, was reduced to subjection, and partly extirpated.

In 1811 and 1812 Ali attacked and defeated the pachas of Berat and Delvino; by which means he gained possession of some of the finest parts of Albania, and a population of between 200,000 and 300,000 souls. Tepellene, his native place, now fell into his power; and now also it was that he obtained the means of inflicting signal vengeance on Gardiki. With his accustomed duplicity he pretended a complete oblivion of all grounds of resentment, until he had surrounded and inclosed the city with his troops; when upwards of 700 of those of the inhabitants who were supposed to have been most deeply involved in the ancient guilt, were dragged into a large khan near the city, and bound together with cords. On a signal given by Ali, the Albanian soldiery, who were stationed on the walls of the khan, began a discharge of musketry, which continued until the destruction of the whole 700 was completed.

The dominions of Ali were not confined within the limits of Albania; he extended his sway over the mountainous district of Macedonia, nearly the whole of Thessaly, and great part of Livadia. He was kept in check by Ismael Bey, possessing an authority nearly as independent over the plains of Macedonia. In Albania, his power was almost absolute; and while little regard was paid to the imperial firman, a letter with the signature of Ali commanded implicit obedience. The Albanians were enthusiastically attached to him; they viewed him as a native sovereign; they admired the energy of his character, and, when they heard of any other chief, commonly remarked, "he has not a head like Ali."

The natives estimated Ali's military force so high as 50,000, 60,000, or even 100,000 men. This could only apply to the case of a general levy *en masse*, in the event of invasion. It does not appear that Ali ever brought into the field a greater disposable force than 15,000. His standing army was supposed to be about 10,000, of whom 4000 or 5000 were stationed round his capital Yanina. The amount of his revenues was still more uncertain. They arose from the following sources:—1. A land-tax, amounting generally to about 10 per cent. of the produce; 2. a tax on cities and towns, levied in the form of requisition; 3. the customs, which he raised to six per cent.; 4. the inheritance of all who died without male heirs.

Ali's figure was corpulent and unwieldy, his neck short, his stature about five feet nine inches. The expression of his countenance was striking and majestic; and his features gave no indications of those terrible qualities by which he was characterized. His abilities were certainly of no mean order. He displayed that union of deep thought and contrivance with prompt and decisive action, which indicate a mind equally formed for politics and for war. He was remarkable for his address, both in gaining friends, and in lulling asleep the suspicions of his bitterest enemies. But, if his abilities were of a superior order, his dispositions were of a kind which rendered him an object of fear and detestation. His cruelty rather resembled that of an Indian savage, than of even the least civilized European. Impaling and roasting alive were among the common punishments reserved for those who had unhappily offended him. The fierceness of his cruelty was only exceeded by the depth of his dissimulation. It was impossible for the most skilful observer to conjecture, from his outward deportment, the real sentiments with which he regarded any individual. The only observable difference consisted in a peculiar kindness of manner towards those unfortunates whose cruel doom he had silently and unrelentingly sealed.

Ali's ordinary residence was near Yanina, in an immense building, which combines the characters of a palace and a fortress. The outer courts were irregularly crowded with Albanian soldiers, and with persons of all descriptions, who attended upon him, or had petitions to present. Each petitioner, in approaching, knelt and kissed his garment. He exercised in person the whole judicial authority; and his decisions, though necessarily given too promptly, are, however, said to have been guided by an apparent wish of arriving at the truth, and of doing justice. He rose at six in the morning, and, with the exception of an hour at dinner and an hour at supper, spent the whole day in business. His habits at table were extremely temperate, though he was not so strict a Mussulman as to decline the use of wine. His haram contained 390 females of various descriptions. It formed an edifice entirely distinct from the rest of the seraglio, and is said to have been furnished in a style of the most gorgeous magnificence; but no European ever found admission into it.

Although the government of Ali was completely despotical, yet, viewed comparatively, it appears to have been better for Albania than the terrible anarchy to which it was formerly exposed. He freed that country from a race of petty tyrants, and from perpetual scenes of internal warfare. His vigorous administration nearly extirpated those numerous predatory hordes who found shelter in the mountainous districts, and spread terror and desolation over the plains.

In the relations between Ali and the court of Constantinople, mutual fear long preserved an outward good understanding. The progress of this enterprising chief was viewed with jealousy and alarm; but the Porte was never in a condition to hazard driving him into open rebellion. It was found prudent, therefore, to invest him, by its firman, with the government of those provinces which the sword had already placed in his possession. Ali, on the other hand, paid an outward deference to the Porte, and remitted to it some portion of the revenue which he collected. He also uniformly supported that power with nearly his whole force, against the foreign enemies with which it has had to contend. He even marched against Paswun Oglou, and was present at the siege of Widdin; and his son Mouktar Pacha distinguished himself greatly against the Russians. In all other respects, whether as to the internal government of Albania, or its foreign relations, he acted completely as an independent monarch. The Porte omitted no means of inducing him to repair to Constantinople, and even proffered to him the dignity of grand vizier; but Ali uniformly resisted every such invitation, well knowing that his arrival at that capital would be the immediate signal for striking off his head.

The Porte, however, has various resources, by which it seldom fails to crush in the end those refractory pachas who succeed in setting a temporary defiance to its authority. Ali was now past 60 years of age; and the dissensions among his sons afforded no prospect of a succession sufficiently vigorous and firm to maintain itself amid so many rivals, and against the whole power of the empire. Pacho Bey, who, from being one of the most favoured adherents of Ali, had incurred his displeasure, and been driven out of Albania, insinuated himself into favour at the court of Constantinople. He fomented all the dissatisfaction then prevalent against his former master, and even laid down plans for his destruction, of which Ali was not long in being apprized. All the surrounding pachalics were bestowed upon his known enemies, who soon hemmed him in on every side. In these circumstances Ali determined to overawe his enemies by one of those fierce and bloody deeds which were familiar to him. He found among his devoted adherents two who undertook to assassinate Pacho Bey. They made the attempt, accordingly, in a public place at Constantinople; but Pacho was only slightly wounded; and the assassins, being seized and led to execution, acknowledged that they were hired by the tyrant of Albania. Incensed by this daring outrage, Mahmood, the present energetic ruler of Turkey, determined no longer to keep any measures. He issued a *firmanley*, placing Ali under the ban of the empire, and calling upon all the surrounding pachas to march their united forces against him as a common enemy. This crisis showed the hollowness of that strength on which Ali had so firmly relied, and by which he had inspired such terror. All the tribes whom, in the zenith of his power, fear or interest had attached to his standard, deserted him in this hour of his terrible need. Pacho Bey had boasted that he would march upon Yanina without firing a gun; and this proud boast he actually fulfilled, Ali being unable to collect any army which could make head against the mass of force now brought to bear upon him. Even his sons made only faint efforts to rally round the falling fortunes of their family. Veli, invested in Prevesa by the captain-pacha, surrendered with all his troops and treasures, obtaining very favourable terms. Mouktar, who defended Berat, was obliged to take refuge with a small force in the citadel of that place.

The Turkish army was now before Yanina, yet Ali was not yet vanquished. He now adopted a measure in entire accordance with his ferocious and desperate character. He gave up that fine capital to indiscriminate pillage by his bandit adherents, after which it was set on fire and destroyed. Ali then retreated to a strong castle in the lake, where he shut himself up with about ten thousand of those who were still ready to follow him through life and death. His position was almost impregnable. He had still an immense treasure, was master of the navigation of the lake, and could communicate with the mountaineer tribes, among whom there yet prevailed an extensive devotion to his cause. In this state of affairs the operations of the besieging army were necessarily reduced to an impotent blockade. In such circumstances an irregular army, without magazines or resources, cannot be long kept together. They began to disperse and return to their homes; and the Turkish ranks were soon so thinned, that the army was obliged to retreat upon Arta, leaving all central Albania again in the possession of Ali.

Mahmood felt of course highly dissatisfied with this result of the extensive operations undertaken against his rebellious viceroy. Chourschid, pacha of the Morea, an officer of high distinction, and who had once held the place of grand vizier, was invested with the supreme command. Having assembled the forces of all the surrounding pachalics, he soon made himself master of the plain country of Albania, and again hemmed in Ali within the precincts of his castle. He was again, however, obliged to slacken the blockade, in consequence of the grand insurrection of the Greeks; which Ali hoped, by declaring loudly in its favour, to use as an instrument in retrieving his fortunes. But his hands had been too deeply dyed in the best blood of Greece; and that people, governed rather by passion than policy, repelled this strange alliance with their mortal enemy. Chourschid, as soon as circumstances admitted, renewed the siege, and pressed it closer and closer; yet there appeared little prospect of success, till treason was resorted to. By immense bribes and promises he gained over Tahir Abbas, an old and hitherto one of the most faithful adherents of Ali. Through this person the castle gates were opened, and the Turks admitted. Yet Ali had still a resource in this last extremity. With a hundred followers, who were personally and entirely devoted to him, and with his wives and his treasure, he retired into a solitary tower, entirely insulated from the rest of the edifice. There he announced his determination, that the instant an enemy should set foot within this last retreat, the whole should be instantly blown into the air. He understood well, that so far as regarded himself, this threat was quite nugatory; but his treasure had long been an eager object of Turkish cupidity, and much would be sacrificed in order to preserve it. Chourschid now redoubled his arts, and bound himself by every vow which the Moslem faith holds most sacred, that Ali, on surrendering, should have not only life, but a secure and splendid retreat. It may be wondered how the jealous old tyrant, so deeply versant in Turkish treasons, should have given in to this snare. He was now closely beset with destruction, and thought perhaps that compliance afforded almost the only hope of life. He came down into the citadel, leaving orders, however, with Selim, his most trusty officer, on a particular signal given, instantly to blow up the tower. Chourschid immediately dispatched a messenger to the Porte, announcing that its arch-enemy was in his hands. He then, by persuasion or threats, obtained from Ali orders for the surrender of the tower and all its contents. Scarcely had this transaction been closed, when Mehemed Pacha arrived with a firman from the Porte, decreeing the immediate death of Ali. The particulars of the last scene have been variously reported. According to some, Mehemed entered, saluted Ali as an old friend, and, amid the exchange of courtesies, stabbed him to the heart. Others report that Ali made a desperate resistance, and that fifty of his followers fought and fell around him. He fell justly, covered with crimes which cried for vengeance to heaven and earth; yet it may be doubted if any of the treasons which rendered him infamous equalled in atrocity that of which he was the victim. His head was carried to Constantinople, and shown to the exulting populace, with a *yafta*, or inscription, expressing the crimes which had drawn upon him the just vengeance of the sublime Porte. The treasure found in the tower, chiefly in jewels, is said to have amounted to about L.800,000; a sum which fell short of the sanguine anticipations which had been formed respecting it.

The Albanians, accustomed to view with disdain the Ottoman yoke, showed a considerable disposition to make common cause with the Greeks; and their co-operation would have almost insured success. But the Greeks, imprudently and unhappily, could not divest themselves of the feelings of enmity cherished during the long series of wars which Ali had waged against them. At the siege of Tripolizza overtures were made to them by a corps of 3000 Albanians, who formed part of the garrison; but the Greeks, having succeeded in entering the place, began a dreadful and indiscriminate massacre, in which the Albanians were equally involved. At the siege of Arta, although the capture was much facilitated by the coming over of a corps of Albanians, the Greeks treated them extremely ill. The Albanian nation was thus forcibly thrown into the arms of the Porte, to which it has since continued attached.

The inhabitants of Albania are estimated at 1,200,000, of which a considerable proportion are Turks and Greeks; but the basis of the population consists of the original race, called Arnauts. This remarkable people differ completely from every other included within the limits of the Turkish empire. Their conversion to Mahometan tenets has been very imperfect, and chiefly induced by political motives. In every family the males usually go to the mosque, the females to church; and some members of a family are seen in the most amicable manner eating from the same table, and even from the same plate, meats forbidden to the others. With the Turks, accordingly, infidel and Albanian are terms nearly synonymous. Ali did not appear to make religion a ground of any the slightest distinction between the different classes of his subjects.

The native Albanian is of a middle stature; his face is oval, with high cheek-bones; his neck long, his chest full and broad. His air is erect and majestic to a degree which never fails to surprise the traveller. He holds in utter contempt that dissimulation which is characteristic of the Greek, and piques himself upon giving utterance to every sentiment without the smallest reserve. Equally remote from the grave and sluggish deportment of the Turk, he is gay, lively, and active. Averse, however, to regular industry, his whole delight is in arms and plunder. He goes constantly armed; and there are few Albanians who, in the prime of their life, have not belonged to some of the numerous bands of robbers who infest the mountains of their native country, of Thessaly, and of Macedonia. This profession carries with it no disgrace; it is common for the Albanian to mention circumstances which occurred "when he was a robber." In proportion as the trade of robbing becomes overstocked, part of those engaged in it seek employment in the service of the sultan, and of the different pachas throughout the Turkish empire; by all of whom the Albanians are regarded as the most valuable of their troops.

An Albanian military force, according to the description of Dr Holland, cannot so properly be called an army, as a tumultuous assemblage of armed men. There is no regular distribution into corps; nor is much regard paid to the authority of any officer, with the single exception of the pacha himself. Yet such is their activity and intrepidity, that they have sometimes proved formidable to the best disciplined European armies. The main strength of the Turkish infantry in the late Russian campaigns has consisted of Albanians.

This fierce and haughty race display a greater degree of contempt for the female sex than is usual even among the most barbarous nations. The females are literally regarded as inferior animals, and treated as such; but in the country districts they are not confined or veiled, as is customary in Mahometan countries.

The dress of the Albanian consists of a cotton shirt, a jacket, a mantle, sandals, and a red cap; to which is added a large *capote*, or great coat, as a shelter from the weather. Every part except the shirt consists of woollen. As they have usually only one suit, which they wear day and night, it soon exhibits a dreadful assemblage of dirt and vermin, and at length literally falls to pieces. The dress of the females is more various, and often fantastical. A singular custom prevails among the girls, of stringing together the pieces of money which they have collected for their portion, and wearing them upon their heads. Some of them have their hair hanging down in braids to a great length, loaded with this species of ornament.

Yanina, the present capital, is beautifully situated on the banks of a small lake, inclosed within a circuit of lofty mountains. The houses in general are not externally either splendid or elegant; and they are built in the most irregular manner, with scarcely any approach to the form of streets. The intermixture, however, of gardens and trees gives to the city a fine appearance from a distance; particularly when combined with the magnificent back-ground which everywhere crowns the landscape. There is a considerable number of Greeks at Yanina, who display an active and intelligent character, and cultivate with ardour the different branches of science and literature. The total number of inhabitants is estimated at upwards of 35,000.

The commerce of Albania is chiefly carried on through Arta, a small city situated on a gulf of the same name, in the most southern district of the country. The principal merchants, however, are Greeks residing at Yanina, among whom a very active commercial spirit appears to prevail. The mercantile houses of this city have often branches in other countries, particularly Germany and Russia; and several of them suffered considerably by the conflagration of Moscow. Under the continental system of the late French ruler, Malta became the great channel for the trade of Albania, and, notwithstanding the subsequent political changes, probably retains it to a certain extent. The exports consist almost entirely of unmanufactured produce. Notwithstanding its mountainous character, the fertility of its plains affords a surplus of grain, of which upwards of fifty cargoes are sent to Italy, the Ionian Isles, Malta, and other places. Wool is exported chiefly unmanufactured, but partly also wrought into coarse cloth. Other important articles of export are, oil, tobacco of good quality, cotton and cotton yarn, chiefly from Thessaly. Some cargoes of wood for building and fire are annually sent to Malta. The chief imports consist of woollen cloths, used for winter coverings. For this purpose the preference is given to a coarser and cheaper species than any that is usually manufactured in Great Britain. This is supplied from Germany. Albania imports also guns, gunpowder, hardware, coffee, and sugar. On the 8th of October an annual fair is opened in the neighbourhood of Yanina, and continues for fourteen days, when the imported articles are exchanged for native commodities, which then pour in from every quarter.

The reader will find much interesting information in regard to this country, and its present ruler, in the *Travels* of Mr Hobhouse and of Dr Holland. The latter resided for some time at Ali's court, where, in quality of physician, he enjoyed the privilege of a familiar intercourse with that extraordinary personage; and the anecdotes which he relates give no small share of interest to his otherwise valuable and instructive publication. (E.)

Albania, a country of Asia, bounded on the west by Iberia; on the east by the Caspian Sea; on the north by Sarmatia; on the south by Armenia and the river Cyrus, now Kur, which, springing from the Moschian Mountains, that separate Colchis from Armenia, falls into the Caspian Sea within a small distance from the southern borders of this country. The whole country, formerly called *Albania*, now goes under the names of *Daghistan, Schirwan*, and *East Georgia*, and is extremely fruitful and pleasant. The ancient historians take notice of the Albanian men being tall, strong-bodied, and, generally speaking, of a very graceful appearance; far excelling all other nations in comeliness as well as stature. Modern travellers extol the beauty of the women. The Albanians were anciently an independent and pretty powerful people; but we find no mention made of their kings till the reign of Alexander the Great, to whom the king of Albania is said to have presented a dog of an extraordinary fierceness and size. It does not appear that the Albanians were ever conquered by the Romans, even when their power was at the greatest height; though, when they ventured to engage in war with that powerful empire, they were always defeated, as might naturally be expected.

ALBANO, a city near the lake of the same name, in the Campagna di Roma, in the Papal territories. It is much admired for the picturesque scenery around it. It is well built, and the Roman aqueduct and other monuments of antiquity are in tolerable preservation. The city contains a cathedral, four monasteries, a nunnery, and 2400 inhabitants. Long. 12. 43. 47. E. Lat. 41. 3. 50. N.

Albano is also a town in the kingdom of Naples, remarkable for the fertility of the surrounding territory, and for the nobility of the inhabitants.

ALBANS, St, a large town of great antiquity, in the hundred of Cashio, in the county of Hertford. It was the ancient Verulam of the Romans and the Watlingcester of the Saxons, and celebrated in more recent times by having conferred a title, by its ancient name, on the great Lord Bacon. The abbey church, now parochial, is of a remote date, built originally of Roman bricks, but since covered with stone. It is 800 feet in length and 174 in its greatest breadth, and contains statues, monuments, and inscriptions of remote origin, which have engaged the attention of artists and antiquaries. The town is finely situated, in part on the declivity of a hill, at the foot of which the river Ver runs through some pleasant meadows. It is surrounded by a district highly fruitful, especially in wheat. The municipal government is in a mayor and burgesses. It returns two members to parliament, who are chosen by the householders paying king's and parochial taxes. The town is divided into four parishes, with churches dedicated to St Alban, St Michael, St Peter, and St Stephen. The only manufacture now carried on is that of plaiting straw for hats. The market, which is large, is on a Saturday. The population has been as follows: in 1811, 3653; in 1821, 4427; and in 1831, 4772. The great increase may be attributed to its being the thoroughfare to the northern parts of the kingdom. It is distant 22 miles from London.

ALBANUS Mons, in *Ancient Geography*, now called *Mont Albano*, 26 miles from Rome, near where Alba Longa stood.

ALBANY, a fortress belonging to the British, seated on the S.W. of Hudson's Bay. Long. 82. 10. W. Lat. 59. 20. N.

Albany, a town of North America, the capital of a county of the same name, and the seat of government for the state of New York. It is a well-built place, and contained 24,238 inhabitants in 1830. It is situated upon the Hudson river, and though 165 miles from the sea, sloops of 80 tons come up to it. Long. 74. 6. W. Lat. 42. 30. N.

ALBARAZIN, a strong town, and one of the most ancient of the kingdom of Arragon, in Spain. It is seated on an eminence near the river Guadalquivir, a little below its source, and on the frontiers of Valencia and New Castile. It is the seat of a bishop, and produces the best wool in all Arragon. It is about 100 miles east of Madrid. Long. 1. 20. E. Lat. 40. 32. N.

ALBARII, in *Antiquity*, properly denoted those who gave the whitening to earthen vessels, *&c.*; in which sense they stood contradistinguished from *Dealbatores*, who whitened walls.

ALBARIUM Opus, in the ancient building, the incrustation or covering of the roofs of houses with white plaster, made of mere lime. This is otherwise called *opus album*. It differed from *Tectorium*, which is a common name given to all roofing or ceiling, including even that formed of lime and sand, or lime and marble; whereas *albarium* was restrained to that made of lime alone.

ALBATEGNI, an Arabic prince of Batan, in Mesopotamia, and a celebrated astronomer, who lived about the year of Christ 880, as appears by his observations. He is also called *Muhammed ben Geber Albatani, Mahomet the son of Geber*, and *Muhamedes Aractensis*. He made astronomical observations at Antioch, and at Racah or Aracta, a town of Chaldea. He is highly spoken of by Dr Halley, as a man of admirable genius, and an excellent observer.

Instead of the tables of Ptolemy, which were imperfect, he computed new ones: these were adapted to the meridian of Aracta or Racah, and were long used as the best among the Arabs. Albategni composed in Arabic a work under the title of *The Science of the Stars*, comprising all parts of astronomy, according to his own observations and those of Ptolemy. This work was translated into Latin by Plato of Tibur, and published at Nuremberg in 1537, with some additions and demonstrations of Regiomontanus. It was reprinted at Bologna in 1645, with this author's notes. Dr Halley detected many faults in these editions. (*Philosophical Transactions* for 1693, No. 204.) In this work Albategni gives the motion of the sun's apogee since Ptolemy's time, as well as the motion of the stars, which he makes one degree in 70 years. He makes the longitude of the first star of Aries to be 18° 2′, and the obliquity of the ecliptic 23° 35′. Upon Albategni's observations were founded the Alphonsine tables of the moon's motion.

ALBATERRA, a town in the government of Orihuela, and province of Valencia, in Spain. It contains 2400 inhabitants, and produces abundance of figs.

ALBATI Equi, an appellation given to such horses, in the games of the ancient circus, as wore white furniture.

ALBATROSS. See Ornithology, *Index*.

ALBAZIN, a town of Greater Tartary, with a strong castle. It is situated upon the river Amur or Yamour, and belongs to the Russians. Long. 103. 30. E. Lat. 54. N.

ALBE, a small piece of money, current in Germany, worth only a French sol and seven deniers.

ALBECK, or Alpeck, a bailiwick in the circle of Jaxt, in Wirtemberg, extending over 114 square miles, or 72,960 acres. It contains one city, three market-towns, and 13,953 inhabitants. The soil is fertile, and produces good crops of corn, flax, hemp, rape-seed, and fruit. The chief trade depends on spinning linen, and on making various wares of wood.

ALBEMARLE, or Aumale, a town of France, in Upper Normandy, now in the department of Seine Inferior, from whence the noble family of Keppel takes the title of Earl. It is seated on the declivity of a hill, on the confines of Picardy, 35 miles north-east of Rouen, and 70 north-west of Paris. Long. 1. 42. E. Lat. 49. 50. N.

ALBENGUA, a town of Italy, in the territory of Genoa. It is the see of a bishop, and is a very ancient, handsome town, but not well peopled, on account of the insalubrity of the air. It is seated in a very beautiful plain, which is well cultivated; and the outside of the town is surrounded with olive-trees. It is a seaport, about 30 miles south-west of Genoa. Long. 8. 13. E. Lat. 44. 4. N.

ALBERNUO, a kind of camlet, brought from the Levant by the way of Marseilles.

ALBERONI, Julius, the son of a poor gardener in the suburbs of Placentia, born in 1664, who, by his great abilities and good fortune, rose from this low origin to the employment of first minister of state at the court of Spain, and to the dignity of cardinal. He roused that kingdom out of the lethargy it had sunk into for a century past, awakened the attention and raised the astonishment of all Europe by his projects, one of which was to set the Pretender on the throne of Great Britain. He was at length deprived of his employment, and banished to Rome. He died in 1752, at the great age of 87. His *Testament Politique*, collected from his memoirs and letters, was published at Lausanne in 1753.

ALBERT, Margrave of Brandenburg, and the last grand master of the Teutonic order, laid aside the habit of his order, embraced Lutheranism, and concluded a peace at Cracow in 1525, by which he was acknowledged duke of the east part of Prussia (formerly called for that reason *Ducal Prussia*), but to be held as a fief of Poland, and to descend to his male heirs. See Prussia.

ALBERTI, Leone Battista, was descended from a noble family of Florence, and was perfectly acquainted with painting, sculpture, and architecture. He wrote of all three in Latin, but his studies did not permit him to leave any thing considerable behind him in painting. He was employed by Pope Nicholas V. in his buildings, which he executed in a beautiful manner; and his work on architecture, which consists of 10 books, is greatly esteemed. He also wrote some treatises of morality, and a piece of arithmetic. He died in 1485.

ALBERTI, a market-town of Hungary, in the province of Hither Danube and the palatinate of Pest, on the line through which the canal intended to unite the Theiss and the Danube is to pass. It is in long. 19. 47. 58. E. lat. 47. 15. N.

ALBERTISTS, a sect of scholastics, so named from their leader Albertus Magnus.

ALBERTUS Magnus, a Dominican friar, and afterwards bishop of Ratisbon, was one of the most learned men and most famous doctors of the 13th century. He is said to have acted as a man-midwife; and some have been highly offended that one of his profession should follow such an employment. A book entitled *De Natura Rerum*, of which he was reputed the author, gave rise to this report. In this treatise there are several instructions for midwives, and so much skill shown in their art, that one would think the author could not have arrived at it without having himself practised; but the advocates for Albert say he was not the writer thereof, nor of that other piece *De Secretis Mulierum*; in which there are many phrases and expressions, unavoidable on such a subject, which gave great offence, and raised a clamour against the supposed author. It must be acknowledged, however, that there are, in his Comment upon the Master of Sentences, some questions concerning the practice of conjugal duty, in which he has used some words rather too gross for chaste and delicate ears; but they allege, what he himself used to say in his own vindication, that he came to the knowledge of so many monstrous things at confession, that it was impossible to avoid touching upon such questions. Albert was certainly a man of a most curious and inquisitive turn of mind, which gave rise to other accusations brought against him. It is said that he laboured to find out the philosopher's stone, that he was a magician, and that he made a machine in the shape of a man, which was an oracle to him, and explained all the difficulties he proposed. He had great knowledge in the mathematics, and by his skill in that science might probably have formed a head with springs capable of articulating sounds, like to the machines of Boetius, of which Cassiodorus has said, "Metals lowe; the birds of Diomedes trumpet in brass; the brazen serpent hisses; counterfeited swallows chatter, and such as have no proper note, from brass send forth harmonious music." John Matthæus de Luna, in his treatise *De Rerum Inventoribus*, has attributed the invention of fire-arms to Albert; but in this he is confuted by Naude in his *Apologie des Grandes Hommes*. Albert died at Cologne in 1280. His works were printed at Lyons in 1651, in 21 volumes folio.

ALBERTUS, a gold coin, worth about fourteen French livres. It was coined during the administration of Albertus, archduke of Austria.

ALBESIA, in *Antiquity*, a kind of shields, otherwise called *Decumana*.

ALBI, a city of France, in the department of the Tarn, the capital of the Albigeois, in Upper Languedoc. The cathedral is dedicated to St Cecilia, and has one of the finest choirs in the kingdom. Here is a very valuable silver shrine, of exquisite workmanship, of the mosaic kind: it contains the relics of St Clair, the first bishop of this city. The chapel of this pretended saint is magnificent, and adorned with paintings. La Lice is a fine large walk without the city. What distinguishes this from all others is a terrace above a deep mall, which serves instead of a fosse: it is bordered with two rows of very fine trees, which are kept in excellent order. There are four gates, through which you may view all the beauties of a delightful plain. At one end of this is the convent of the Dominicans. The archbishop's palace is very beautiful. The river washes its walls, and serves both for an ornament and defence. This city is seated on the river Tarn, 35 miles north-east of Toulouse, and contained 9860 inhabitants by the last census. Long. 2. 9. E. Lat. 43. 56. N.

The Albigeois is a small territory, about twenty-seven miles in length and twenty in breadth, abounding in corn, wood, grapes, saffron, plums, and sheep; and the inhabitants have a great trade in dried prunes, grapes, a coarse sort of cloth, and wine of Gaillac. These wines are the only sort hereabouts that are fit for exportation: they are carried down to Bourdeaux, and generally sold to the British. They have likewise several coal-mines.

ALBIGENSES, in *Church History*, a sect or party of reformers, about Toulouse and Albigeois, in Languedoc, who sprung up in the 12th century, and distinguished themselves by their opposition to the discipline and ceremonies of the Romish church.

This sect had their name, it is supposed, either by reason there were great numbers of them in the diocese of Albi, or because they were condemned by a council held in that city. In effect, it does not appear that they were known by this name before the holding of that council. The *Albigenses* were also called *Albiani*, *Albigesei*, *Albii*, and *Albanenses*, though some distinguish these last from them. Other names given to them are *Henricians*, *Abelardists*, *Bulgarians*, &c.; some on account of the qualities they assumed; others on that of the country from whence it is pretended they were derived; and others on account of persons of note who adopted their cause, as Peter de Brius, Arnold de Bresse, Abelard, Henry, &c. Berengarius, if not Wickliffe himself, is by some ranked in the number. The *Albigenses* are frequently confounded with the *Waldenses*; from whom, however, they differ in many respects, both as being prior to them in point of time, as having their origin in a different country, and as being charged with divers heresies, particularly Manicheism, from whence the *Waldenses* are exempt. But several Protestant writers have vindicated them from that imputation. Dr Allix shows that a great number of *Manichees* did spread over the western countries from Bulgaria, and settled in Italy, Languedoc, and other places, where there were also *Albigenses*; by which means, being both under the imputation of *heresy*, they came, either by ignorance or malice, to be confounded, and called by the same common name, though in reality entirely different.

Other errors imputed to them by their opponents, the monks of those days, were, that they admitted two Christs; one evil, who appeared on earth; the other good, who has not yet appeared: that they denied the resurrection of the body, and maintained human souls to be demons imprisoned in our bodies, by way of punishment for their sins: that they condemned all the sacraments of the church, rejected baptism as useless, held the eucharist in abhorrence, excluded the use of confessions and penance, maintained marriage unlawful, laughed at purgatory, prayers for the dead, images, crucifixes, &c. There were likewise said to be two classes of them, the Perfect and the Believers. The perfect boasted of their living in continence, of eating neither flesh, eggs, nor cheese. The believers lived like other men, and were even loose in their morals; but they were persuaded they should be saved by the faith of the perfect, and that none were damned who received imposition of hands from them. But from these charges also they are generally acquitted by Protestants, who consider them as the pious inventions of the Romish church, whose members deem it meritorious by any means to blacken heretics.

However this be, the Albigenses grew so formidable, that the Catholics agreed upon a holy league or crusade against them. They were at first supported by Raymond, count of Toulouse. Pope Innocent III., desirous to put a stop to their progress, sent a legate into their country; which failing, he stirred up Philip Augustus, king of France, and the other princes and great men of the kingdom, to make war upon them. Upon this the count of Toulouse, who had sided with them, made his submission to the pope, and went over to the Catholics; but soon after, finding himself plundered by the crusaders, he declared war against them, and was joined by the king of Arragon. His army was defeated at the siege of Muret, where he himself was killed, and the defeat followed by the surrender of the city of Toulouse, and the conquest of the greater part of Languedoc and Provence. His son Raymond succeeded him, who agreed with the king and the pope to set up the inquisition in his estates, and to extirpate the Albigenses. In an assembly held at Milan, the archbishop of Toulouse drew up articles, agreeably to which the count made a most ample declaration against them, which he published at Toulouse in 1258. From this time the Albigenses dwindled by little and little, till the time of the Reformation, when such of them as were left fell in with the Vaudois, and became conformable to the doctrine of Zuinglius and the discipline of Geneva.

ALBIGENSES is also a name sometimes given to the followers of Peter Vaud or Waldo, and hence synonymous with what we more properly call *Waldenses*, or Poor Men of Lyons. In this sense the word is applied by Camerarius, Thuanus, and several other writers. The reason seems to be, that the two parties agreed in their opposition to the papal innovations and encroachments, though in divers other respects said to be different enough. The bishop of Meaux labours hard to support a distinction between the two sects, alleging that the *Albigenses* were heretics and Manichees; whereas the *Waldenses* were only schismatics, not heretics; being sound as to articles of faith, and only separating from the church of Rome on account of forms and discipline. Dr Allix endeavours to set aside the distinction, and shows that both of them held the same opinions, and were equally condemned and held for heretics; and this not for points of faith, but for declaiming against the papal tyranny and idolatry, and holding the pope to be the Antichrist; which last, according to M. de Meaux, constitutes nothing less than Manicheism. In this sense, the Lollards and Wickliffites in England were not only Albigenses, but Manichees.

ALBINI, in *Antiquity*, the workmen employed in what was called *opus albarium*. They make a different profession from the *dealbatores* or *whiteners*.

ALBINOS, the name by which the Portuguese call the white Moors, who are looked upon by the negroes as monsters. They at a distance might be taken for Europeans; but when you come near them, their white colour appears like that of persons affected with a leprosy.

In Saussure's *Voyages dans les Alpes* is the following account of the two boys, at Chamouni, who have been called *Albinos*. "The elder, who was at the end of the year 1785 about 20 or 21 years of age, had a dull look, with lips somewhat thick, but nothing else in his features to distinguish him from other people. The other, who is two years younger, is rather a more agreeable figure; he is gay and sprightly, and seems not to want wit. But their eyes are not blue; the iris is of a very distinct rose colour: the pupil, too, when viewed in the light, seems decidedly red; which seems to demonstrate that the interior membranes are deprived of the uvea, and of that black mucous matter that should line them. Their hair, their eye-brows and eye-lashes, the down upon their skin, were all in their infancy of the most perfect milk-white colour, and very fine; but their hair is now of a reddish cast, and has grown pretty strong. Their sight, too, is somewhat strengthened, though they exaggerate to strangers their aversion for the light, and half shut the eye-lids, to give themselves a more extraordinary appearance; but those who, like me, have seen them in their infancy, before they were tutored to this deceit, and when too few people came to Chamouni to make this affectation profitable to them, can attest that then they were not very much offended with the light of day. At that time they were so little desirous of exciting the curiosity of strangers, that they hid themselves to avoid such; and it was necessary to do a sort of violence to them before they could be prevailed on to allow themselves to be inspected. It is also well known at Chamouni, that when they were of a proper age they were unable to tend the cattle like the other children at the same age; and that one of their uncles maintained them out of charity, at a time of life when others were capable of gaining a subsistence by their labour.

"I am therefore of opinion, that we may consider these two lads as two albinos; for if they have not the thick lips and flat noses of the white negroes, it is because they are albinos of Europe, not of Africa. This infirmity affects the eyes, the complexion, and the colour of the hair; it even diminishes the strength, but does not alter the conformation of the features. Besides, there are certainly in this malady various degrees—some may have less strength, and be less able to endure the light; but these circumstances in those of Chamouni are marked with characters sufficiently strong to entitle them to the unhappy advantage of being classed with that variety of the human species denominated albinos.

"When nature presents the same appearance often, and with circumstances varied, we may at last discover some general law, or some relation which that appearance has with known causes; but when a fact is so singular and so rare as that of those albinos, it gives but little scope to a conjecture; and it is very difficult to verify those by which we attempt to explain it.

"I at first imagined that this disease might be referred to a particular sort of organic debility; that a relaxation of the lymphatic vessels within the eye might suffer the globules of the blood to enter too abundantly into the iris, the uvea, and even into the retina, which might occasion the redness of the iris and of the pupil. The same debility seemed also to account for the intolerance of the light, and for the whiteness of the hair.

"But a learned physiologist, M. Blumenbach, professor in the university of Göttingen, who has made many profound observations on the organs of sight, and has considered with great attention the albinos of Chamouni, attributes their infirmity to a different cause.

"The study of comparative anatomy has furnished him with frequent opportunities of observing this phenomenon; he has found it in brutes, in white dogs, and in owls; he says it is generally to be seen in the warm-blooded animals, but that he has never met with it in those with cold blood.

"From his observations, he is of opinion that the redness of the iris, and of the other internal parts of the eye, as well as the extreme sensibility that accompanies this redness, is owing to the total privation of that brown or blackish mucus, which, about the fifth week after conception, covers all the interior parts of the eye in its sound state. He observes that Simon Pontius, in his treatise *de Coloribus Oculorum*, long ago remarked, that in blue eyes the interior membranes were less abundantly provided with this black mucus, and were therefore more sensible to the action of light. This sensibility of blue eyes agrees very well, says M. Blumenbach, with northern people, during their long twilight; while, on the contrary, the deep black in the eyes of negroes enables them to support the splendour of the sunbeams in the torrid zone.

"As to the connection between this red colour of their eyes and the whiteness of the skin and hair, the same learned physiologist says, that it is owing to a similarity of structure, *consensus ex similitudine fabricæ*. He asserts that this black mucus is formed only in the delicate cellular substance, which has numerous blood-vessels contiguous to it, but contains no fat, like the inside of the eye, the skin of negroes, the spotted palate of several domestic animals, &c. And, lastly, he says that the colour of the hair generally corresponds with that of the iris. (*Gazette Litt. de Gottingue*, Oct. 1784.)

"At the very time that M. Blumenbach was reading this memoir to the Royal Society of Göttingen, M. Buzzi, surgeon to the hospital at Milan, an élève of the celebrated anatomist Moscati, published in the *Opuscoli Scelti de Milan*, 1784, tom. vii. p. 11, a very interesting memoir, in which he demonstrates by dissection what Blumenbach had only supposed.

"A peasant of about 30 years of age died in the hospital of Milan of a pulmonary disorder. His body being exposed to view, was exceedingly remarkable by the uncommon whiteness of the skin, of the hair of the beard, and of all the other covered parts of the body. M. Buzzi, who had long desired an opportunity of dissecting such a subject, immediately seized upon this. He found the iris of the eyes perfectly white, and the pupil of a rose colour. The eyes were dissected with the greatest possible care, and were found entirely destitute of that black membrane which anatomists call the *uvea;* it was not to be seen either behind the iris or under the retina. Within the eye there was only found the choroid coat, extremely thin, and tinged of a pale red colour, by vessels covered with discoloured blood. What was more extraordinary, the skin, when detached from different parts of the body, seemed almost entirely divested of the *rete mucosum;* maceration did not discover the least vestige of this, not even in the wrinkles of the abdomen, where it is most abundant and most visible.

"M. Buzzi likewise accounts for the whiteness of the skin and of the hair, from the absence of the *rete mucosum*, which, according to him, gives the colour to the cuticle, and to the hairs that are scattered over it. Among other proofs of this opinion, he alleges a well-known fact, that if the skin of the blackest horse be accidentally destroyed in any part of the body, the hairs that afterwards grow on that part are always white, because the *rete mucosum* which tinges those hairs are never regenerated with the skin.

"The proximate cause of the whiteness of albinos, and the colour of their eyes, seems therefore pretty evidently to depend on the absence of the *rete mucosum;* but what is the remote cause?

"In the first place, it seems probable that men affected with this infirmity form no distinct species, for they are produced from parents that have dark skins and black eyes. What is it then that destroys the *rete mucosum* in such persons? M. Buzzi relates a singular fact, which seems to throw some light on this subject.

"A woman of Milan, called Calcagni, had seven sons. The two oldest had brown hair and black eyes; the three next had white skins, white hair, and red eyes; the two last resembled the two eldest. It was said that this woman, during the three pregnancies that produced the albinos, had a continual and immoderate appetite for milk, which she took in great quantities; but that when she was with child of the other four children, she had no such desire. It is not, however, ascertained that this preternatural appetite was not itself the effect of a certain heat, or internal disease, which destroyed the *rete mucosum* in the children before they were born.

"The albinos of Chamouni are also the offspring of parents with dark skins and black eyes. They have three sisters by the same father and mother, who are also brunettes. One of them that I saw had the eyes of a dark brown, and the hair almost black. They are said, however, to be all afflicted with a weakness of sight. When the lads are married, it will be curious to observe how the eyes of their children will be formed. The experiment would be particularly decisive if they were married to women like themselves. But this faulty conformation seems to be more rare among women than among men; for the four of Milan, the two of Chamouni, the one described by Maupertuis, the one by Helvetius, and almost all the instances of these singular productions, have been of our sex. It is known, however, that there are races of men and women affected with this disease, and that these races perpetuate themselves in Guinea, in Java, at Panama, &c.

"Upon the whole, this degeneration does not seem to be owing to the air of the mountains; for though I have traversed the greatest part of the Alps, and the other mountains of Europe, these are the only individuals of that kind that I ever met with."

ALBINOVANUS, a Latin poet, whom Ovid surnamed the *Divine*. There is now nothing of his extant, except an elegy on Drusus, and another on the death of Mecænas.

ALBINUS, Bernhard Siegfred, a celebrated physician and anatomist, was born of an illustrious family at Frankfort on the Oder in 1697. His father was then professor of the practice of medicine in the university of Frankfort; but in the year 1702 he repaired to Leyden, being nominated professor of anatomy and surgery in that university. Here his son had an opportunity of studying under the most eminent masters in Europe, who, from the singular abilities which he then displayed, had no difficulty in prognosticating his future eminence. But while he was distinguished in every branch of literature, his attention was particularly turned to anatomy and surgery. His peculiar attachment to these branches of knowledge gained him the intimate friendship of Ruysch and Rau, who at that time flourished in Leyden; and the latter, so justly celebrated as a lithotomist, is said to have seldom performed a capital operation without inviting him to be present. Having finished his studies at Leyden, he went to Paris, where he attended the lectures of Du Verney, Vaillant, and other celebrated professors. But he had scarce spent a year there when he was invited by the curators of the university of Leyden to be a lecturer on anatomy and surgery at that place. Though contrary to his own inclination, he complied with their request, and upon that occasion was created doctor of physic without any examination. Soon after, upon the death of his father, he was appointed to succeed him as professor of anatomy; and upon being admitted into that office on the 9th of November 1721, he delivered an oration, *De vera via ad fabricæ humani corporis cognitionem ducente*, which was heard with universal approbation. In the capacity of a professor, he not only bestowed the greatest attention upon the instruction of the youth intrusted to his care, but on the improvement of the medical art. With this view he published many important discoveries of his own, and by elegant editions turned the attention of physicians to works of merit, which might otherwise have been neglected. By these means his fame was soon extended over Europe; and the societies of London, Petersburg, and Haerlem, cheerfully received him as an associate. In 1745 he was appointed professor of the practice of medicine at Leyden, and was succeeded in the anatomical chair by his brother Frid. Bern. Albinus. He was twice rector of the university, and as often he refused that high honour when it was voluntarily offered him. At length, worn out by long service and intense study, he died on the 9th of September 1770, in the 74th year of his age.

ALBION, the ancient name of Britain.

New Albion, a name given by Sir Francis Drake to California, on the north-west coast of America, which he discovered and took possession of in the year 1578. Captain Cook visited this coast in 1778, and landed in a place situated in long. 235. 20. E. lat. 44. 33. N. In the year 1792 it was again visited by Captain Vancouver, who was employed in surveying the western coast of North America. The name is now applied to a country farther north than California, but without any definite boundaries.

ALBIREO, in *Astronomy*, a star of the third or fourth magnitude, in the constellation Cygnus.

ALBIS, in *Ancient Geography*, now the Elbe, which divided ancient Germany in the middle, and was the boundary of this country, so far as it was known to the Romans; all beyond they owned to be uncertain, no Roman except Drusus and Tiberius having penetrated so far as the Elbe.

ALBISOLA, a small town belonging to the republic of Genoa. Here is a porcelain manufacture, and several country-houses of the Genoese nobility. It was bombarded in 1745 by the English. Long. 8. 20. E. Lat. 44. 15. N.

ALBLASSER-WAARD, a district in the circle of Dordrecht and province of Holland, inclosed on two sides by the Merwe, and on the third by the Lech. It receives its name from the river that flows through it, and comprehends sixteen villages, which yield abundance of good hemp.

ALBOGALERUS, in *Roman Antiquity*, a white cap worn by the *flamen Dialis*, on the top of which was an ornament of olive branches.

ALBORAK, amongst the Mahometan writers, the beast on which Mahomet rode in his journeys to heaven. The Arab commentators give many fables concerning this extraordinary mode of conveyance. It is represented as of an intermediate shape and size between an ass and a mule. A place, it seems, was secured for it in paradise at the intercession of Mahomet; which, however, was in some measure extorted from the prophet, by Alborak's refusing to let him mount when the angel Gabriel was come to conduct him.

ALBORO, in *Zoology*, a name by which the erythrinus, a small red fish caught in the Mediterranean, is commonly known in the markets of Rome and Venice.

ALBOURG, a town of Denmark, in North Jutland, capital of the diocese of the same name, and a bishop's see. It has this name, which signifies *eel-town*, on account of the great number of eels taken here. It is seated on a canal 10 miles from the sea, 30 north of Wiburg, and 50 north of Aarhuus. It has an exchange for merchants, and a safe and deep harbour. They have a considerable trade in herrings and corn, and a manufactory of guns, pistols, saddles, and gloves. Long. 9. 50. E. Lat. 57. 2. N.

ALBRICIUS, born at London, was a great philosopher, a learned and able physician, and well versed in all the branches of polite literature. He lived in the 11th century, and wrote several works in Latin; particularly, 1. Of the Origin of the Gods; 2. The Virtues of the Ancients; 3. The Nature of Poison.

ALBUERA, a town of Spain, in the province of Estremadura, which has been rendered celebrated by a victory gained there on the 16th of May 1811, over a French army marching from Seville to the relief of Badajos, which was besieged by Marshal Beresford.

ALBUFEIRA, a Portuguese town, on a bay in the province of Algarve, containing 1 parish church, 1 hospital, 1 poor-house, 962 houses, and 3181 inhabitants. Its harbour is capable of containing large ships, and is well defended by a castle and battery. Lat. 37. 7. N.

ALBUM, in *Antiquity*, a kind of white table or register, wherein the names of certain magistrates, public transactions, &c. were entered. Of these there were various sorts; as the *album decurionum, album senatorum, album judicum, album pretoris*, &c.

ALBUM *Decurionum* was the register wherein the names of the decuriones were entered. This is otherwise called *matriculatio decurionum*.

ALBUM *Senatorum*, the list of senators' names, which was first introduced by Augustus, and renewed yearly.

ALBUM *Judicum*, that wherein the names of the persons of those *decuriæ* who judged at certain times were entered.

ALBUM *Pretoris*, that wherein the *formulæ* of all actions, and the names of such judges as the pretor had chosen to decide causes, were written.

The high-priest entered the chief transactions of each year into an *album*, or table, which was hung up in his house for the public use.

ALBUM is also used, in later times, to denote a kind of table, or pocket-book, wherein the men of letters with whom a person has conversed inscribed their names, with some sentence or motto.

ALBUM *Græcum*, the white dung of dogs, formerly prescribed for inflammations of the throat, &c. but now disused, and chiefly employed by leather-dressers to soften leather after the application of lime.

ALBUMAZAR, a learned Arabian astronomer in the tenth century, who wrote a treatise *Of the Revolution of the Years*.

ALBUMEN, a substance found both in animal and vegetable matters, and in great abundance in the white of eggs.

ALBUQUERQUE, a town of Spain, in the province of Estremadura, is seated on an eminence, nine miles from the frontiers of Portugal, and containing 5500 inhabitants. It is commanded by an almost impregnable fortress, built on a high mountain, and serving to defend the town. It has some trade in wool and woollen manufactures. It was taken by the allies of Charles king of Spain in 1705. Long. 7. 0. W. Lat. 38. 52. N.

ALBURN, the English name of a compound colour, being a mixture of white and red, or reddish brown. Skinner derives the word, in this sense, from the Latin *albus*, and the Italian *burno*, from *bruno*, brown.

ALBURNUM, the soft white substance which in trees is found between the liber or inner bark and the wood, and in process of time acquiring solidity, becomes itself the wood. From its colour and comparative softness, it has been styled by some writers the fat of trees, *adeps arborum*.

ALBY, an arrondissement in the south-west of France, in the department of the Tarn, comprehending an extent of 566 square miles, or 362,240 acres. It is divided into 8 cantons and 105 communes, and contains 70,054 inhabitants.

ALCÆUS, a famous ancient lyric poet, born at Mitylene, in the island of Lesbos. Horace seems to think him the inventor of this kind of poesy.

Now the Roman muse inspire,
And warm the song with Grecian fire. FRANCIS.

He flourished in the 44th Olympiad, at the same time with Sappho, who was likewise of Mitylene. Alcæus was a great enemy to tyrants, but not a very brave soldier. He was present at an engagement wherein the Athenians gained a victory over the Lesbians; and here, as he himself is said to have confessed in one of his pieces, he threw down his arms, and saved himself by flight. Horace, who of all the Latin poets most resembled Alcæus, has made the like confession:

With thee I saw Philippi's plain,
Its fatal rout, a fearful scene!
And dropp'd, alas! th' inglorious shield,
Where valour's self was forc'd to yield;
Where soil'd in dust the vanquish'd lay,
And breath'd th' indignant soul away. FRANCIS.

The poetical abilities of Alcæus are indisputable; and though his writings were chiefly in the lyric strain, yet his muse was capable of treating the sublimest subjects with a suitable dignity. Hence Horace says,

Alcæus strikes the golden strings,
And seas, and war, and exile, sings.
Thus while they strike the various lyre,
The ghosts the sacred sounds admire;
But when Alcæus lifts the strain
To deeds of war and tyrants slain,
In thicker crowds the shadowy throng
Drink deeper down the martial song. FRANCIS.

ALCÆUS, an Athenian tragic poet, and, as some think, the first composer of tragedies. He renounced his native country Mitylene, and passed for an Athenian. He left 10 pieces, one of which was Pasiphaë, that which he produced when he disputed with Aristophanes, in the 4th year of the 97th Olympiad.

There is another ALCÆUS mentioned in Plutarch, perhaps the same whom Porphyrius mentions as a composer of satirical iambics and epigrams, and who wrote a poem concerning the plagiarism of Euphorus the historian. He lived in the 145th Olympiad.

We are told likewise of one ALCÆUS, a Messenian, who lived in the reign of Vespasian and Titus. We know not which of these it was who suffered for his lewdness a very singular kind of death, which gave occasion to the following epitaph:

Αλκαιου ταφος ουτος, &c.

This is Alcæus's tomb, who died by a radish,
The daughter of the earth, and punisher of adulterers.

This punishment, inflicted on adulterers, was thrusting one of the largest radishes up the anus of the adulterer; or, for want of radishes, they made use of a fish with a very large head, which Juvenal alludes to:

Quosdam mœchos et mugilis intrat. Sat. x.
The mullet enters some behind.

Hence we may understand the menace of Catullus:

Ah! tum te miserum, malique fati,
Quem attractis pedibus, patente porta,
Percurrent raphanique, mugilesque. Epig. xv.

Ah! wretched thou, and born to luckless fate,
Who art discover'd by the unshut gate!
If once, alas! the jealous husband come,
The radish or the sea-fish is thy doom.

ALCAICS, in *Ancient Poetry*, a denomination given to several kinds of verse, from Alcæus, their inventor.

The first kind consists of five feet, viz. a spondee or iambic, an iambic, a long syllable, a dactyle, another dactyle. Such is the following verse of Horace:

Omnes | eo'dem | cogimur, | omnium
Versa|tur ur|na | serius, | ocius,
Sors exitura.

The second kind consists of two dactyles and two trochees; as,

Exili|um impo|siture | cymbæ.

Besides these two, which are called *dactylic Alcaics*, there is another, simply styled *Alcaic*, consisting of an epitrite, a choriambus, another choriambus, and a bacchius. The following is of this species:

Cur timet fla|vum Tiberim | tangere, cur | olivum?

Alcaic Ode, a kind of manly ode, composed of several strophes, each consisting of four verses; the first two of which are always alcaics of the first kind; the third verse is a dimeter hypercatalectic, or consisting of four feet and a long syllable; and the fourth verse is an alcaic of the second kind. The following strophe is of this species, which Horace calls *minaces Alcæi camenæ.*

Non possidentem multa vocaveris
Recte beatum; rectius occupat
Nomen beati, qui deorum
Muneribus sapienter uti, &c.

ALCAID, **Alcayde**, or **Alcalde**, in the polity of the Moors, Spaniards, and Portuguese, a magistrate or officer of justice, answering nearly to the French provost and the British justice of peace. The alcaid among the Moors is vested with supreme jurisdiction, both in civil and criminal cases.

ALCALA de Guadeira, a small town of Spain, in Andalusia, upon the river Guadeira. Here are abundance of springs, from whence they convey water to Seville by an aqueduct. Long. 6. 16. W. Lat. 37. 15. N.

Alcala de Henares, a city of Spain, in the province of New Castile. It is celebrated for its university, which is considered the best ecclesiastical school in the kingdom. It was founded by Cardinal Ximenes; and one of its first and best productions has been the Complutensian edition of the Holy Scriptures, which was prepared here. The river Henares runs by the city, and gives its distinguishing name. Here is also a military school for the artillery and engineer corps; 1600 houses, 4760 inhabitants. Its powder-mills produce 15 cwt. annually.

Alcala-Real, a small city of Spain, in Andalusia, with a fine abbey. It is built on the top of a high mountain, in a mountainous country, nine leagues from Jaen. It bears the title of a city, and contains a rich abbey and a population of 8000 or 9000. Long. 4. 15. W. Lat. 37. 18. N.

ALCALY, or **Alcali**, or **Alkali**. See Chemistry, *Index*.

ALCAMO, a city of Sicily, on the river Freddo or St Bartholomew, in the intendancy of Trapani. It is a parliamentary city, in a district of peculiar fertility, which produces some of the best wines of the island. It contains a very strong castle, many churches and monasteries, and 13,000 inhabitants. Near to it are remains of the ancient Segesta, with its temple and theatre in good preservation; and near the sea are some celebrated warm baths.

ALCANIZ, a Spanish town upon the Guadaloupe, in the province of Arragon, with a college, three parish churches, six monasteries, one hospital, and 4200 inhabitants. The surrounding country is wild, but rich in olives, mulberry trees, and alum.

ALCANNA, or **Alkanna**, in *Commerce*, a powder prepared from the leaves of the Egyptian privet, in which the people of Cairo drive a considerable trade. It is much used by the Turkish women, to give a golden colour to their nails and hair. In dyeing, it gives a yellow colour when steeped with common water, and a red one when infused in vinegar. There is also an oil extracted from the berries of alcanna, which is sometimes used in medicine.

ALCANTARA, a town of Spain, in the province of Estremadura, on the left bank of the Tagus, over which is a magnificent bridge. It is in long. 6. 10. W. lat. 39. 44. N. It has two parish churches, five monasteries, and 3000 inhabitants.

Knights of Alcantara, a military order of Spain, which took its name from the above-mentioned city. They make a very considerable figure in the history of the expeditions against the Moors. The knights of Alcantara make the same vows as those of Calatrava, and are only distinguished from them by this, that the cross fleur de lis, which they bear over a large white cloak, is of a green colour. They possess 37 commanderies. By the terms of the surrender of Alcantara to this order, it was stipulated that there should be a confraternity between the two orders, with the same practices and observances in both; and that the order of Alcantara should be subject to be visited by the grand master of Calatrava. But the former soon released themselves from this engagement, on pretence that their grand master had not been called to the election of that of Calatrava, as had been likewise stipulated in the articles. After the expulsion of the Moors, and the taking of Granada, the sovereignty of the order of Alcantara and that of Calatrava was settled in the crown of Castile by Ferdinand and Isabella. In 1540 the knights of Alcantara sued for leave to marry, which was granted them.

ALCARAZ, a small city of La Mancha, in Spain, defended by a pretty strong castle, and remarkable for an ancient aqueduct. It stands near the river Guardamena, and the soil about it is very fruitful. They have a breed of little running horses, which are very fleet and strong. It is 25 miles north of the confines of Andalusia, 108 south of Cuença, and 138 south by east of Madrid. Long. 2. 45. W. Lat. 38. 56. N.

ALCASSAR do Sal, a town of Portugal, in Estremadura, which has a castle said to be impregnable. It is indeed very strong, both by art and nature, being built on the top of a rock which is exceedingly steep on all sides. Here is a salt-work, which produces very white salt, from whence the town takes its name. The fields produce large quantities of a sort of rushes, of which they make mats, which are transported out of the kingdom. Long. 9. 10. W. Lat. 38. 18. N.

Alcassar, a city of Barbary, seated about two leagues from Larache, in Asga, a province of the kingdom of Fez. It was of great note, and the seat of the governor of this part of the kingdom. It was built by Jacob Almanzor, king of Fez, about the year 1180, and designed for a magazine and place of rendezvous for the great preparations he was making to enter Granada in Spain, and to make good the footing which Joseph Almanzor had got some time before. It is said his father first invaded Spain with 300,000 men, most of whom he was obliged to bring back to Africa to quell a rebellion that had broke out in Morocco. This done, he returned to Spain again with an army, as is said, of 200,000 horse and 300,000 foot. The city is now fallen greatly to decay, so that of fifteen mosques there are only two that they make use of. The reason, probably, is the bad situation of the town; for it stands so low, that it is excessively hot in summer, and almost overflowed with water in the winter. This they affirm to be owing to the curse of one of their saints. Here are a great number of storks, which live very familiarly with the people, walking about the town, possessing the tops of the houses and mosques without molestation; for they esteem them sacred birds, and account it sinful to disturb them. At present the bashaw of Tetuan appoints a governor to this town, which is the last of his dominions towards Mequinez. Near this city there is a high ridge of mountains running towards Tetuan, whose inhabitants were never brought entirely under subjection; and whenever it was attempted, they revenged themselves by infesting the roads and robbing and destroying the travellers. When they were pursued, they retired into their woody mountains, where none could safely follow them. Not far from hence is the river Elmahassen, famous for the battle fought between Don Sebastian, king of Portugal, and the Moors, in which the Portuguese were defeated, and their king slain. Long. 12. 35. W. Lat. 35. 15. N.

ALCAUDETE, a town of Andalusia, in Spain, in the province of Jaen, in a fertile territory, producing wine, oil, corn, and abundance of fruits. It has a castle, two parish churches, four monasteries, and 4000 inhabitants.

ALCAVALA, in the *Spanish Finances*, was at first a tax of 10 per cent., afterwards of 14 per cent., and is at present of only 6 per cent., upon the sale of every sort of property, whether movable or immovable; and it is repeated every time the property is sold. The levying of this tax requires a multitude of revenue officers sufficient to guard the transportation of goods, not only from one province to another, but from one shop to another. It subjects not only the dealers in some sort of goods, but those in all sorts, every farmer, every manufacturer, every merchant and shopkeeper, to the continual visits and examination of the tax-gatherers. Through the greater part of a country in which a tax of this kind is established, nothing can be produced for distant sale. The produce of every part of the country must be proportioned to the consumption of the neighbourhood. It is to the Alcavala, accordingly, that Ustaritz imputes the ruin of the manufactures of Spain. He might have imputed to it likewise the declension of agriculture, it being imposed not only upon manufacturers, but upon the rude produce of the land.

ALCAZAR DE ST JUAN, a city on the border of a small lake, in the province of Toledo, in Castile. It contains 2200 inhabitants. It has a saltpetre refinery, and some gunpowder works.

ALCAZAR *Leguer*, a town of Africa, in the kingdom of Fez, and in the province of Ilabat. It was taken by Alphonso, king of Portugal, in 1468; but soon after that it was abandoned to the Moors. It is seated on the coast of the straits of Gibraltar. Long. 3. 50. W. Lat. 38. 0. N.

ALCHEMY, that branch of chemistry which had for its principal objects the transmutation of metals into gold, the panacea or universal remedy, an alkahest or universal menstruum, an universal ferment, and many other things equally ridiculous.

Kircher, instructed in all the secrets of chemistry, has fully exposed the artifices and impostures of alchemists. An alchemist puts into a crucible the matter which is to be converted into gold: this he sets on the fire, blows it, stirs it with rods, and, after divers operations, gold is found at the bottom of the crucible, instead of the matter first put in. This there are a thousand ways of effecting, without any transmutation. Sometimes it is done by dexterously dropping in a piece of gold concealed between the fingers; sometimes by casting in a little of the dust of gold or silver, disguised under the appearance of some elixir, or other indifferent matter; sometimes a crucible is used which has a double bottom, and gold put between the two; sometimes the rod used to stir the matter is hollow, and filled with the dust of the metal desired; at other times there is metal mixed with the charcoal, the ashes of the furnace, or the like. Mr Harris very properly distinguishes alchemy from chemistry, and defines the former to be *ars sine arte, cujus principium est mentiri, medium laborare, et finis mendicare;* and the Italians have a proverb, *non ti fidiare al alchemista povero o medico amalato.* The ruin which has attended this delusion has occasioned several states to make severe laws against pretences to alchemy. The Romans formerly banished all such as professed it; and the sacred canons likewise directed the thunder of their censure against them. Dioclesian and Cæsar directed all books which treated of this subject to be burnt. Rymer furnishes us with a licence for practising alchemy, with all kinds of metals and minerals, granted to one Richard Carter in 1476. (Rym. *Fœd.* tom. xii.) Nevertheless we have had severe laws against alchemy, and multiplying of metals, as much so as against coining itself.

ALCIAT, or ALCIATE, ANDREW, a great lawyer, who flourished in the 10th century, was born at Milan. He mixed much of polite learning in the explication of the laws, and happily drove out the barbarity of language which till then had reigned in the lectures and writings of lawyers; for which Thuanus highly praises him. He published a great many law-books, and some notes upon Tacitus. His *Emblems* have been much admired, and translated into French, Italian, and Spanish; and several learned men have written commentaries on them.

ALCIBIADES, an Athenian general. It was the fate of this great man to live at a time when his country was a scene of confusion. The Greeks, grown insolent from their conquests in Persia, turned their armies against each other, and bandied together under the conduct of the two most opulent states, Athens and Lacedemon. Alcibiades, in the midst of an expedition he had planned against the enemies of his country, was recalled home to answer some charge of a private nature; but fearing the violence of his enemy, instead of going to Athens, he offered his services at Sparta, where they were readily accepted. By his advice the Lacedemonians made a league with Persia, which gave a very favourable turn to their affairs. But his credit in the republic raising jealousies against him, he privately reconciled himself to his country, and took again the command of the Athenian army. Here victory, waiting as it were at his command, attended all his motions. The loss of seven battles obliged the Spartans to sue for peace. He enjoyed his triumphs, however, only a short time at Athens. One unsuccessful event made him again obnoxious to the malice of his citizens, and he found it expedient to retire from Athens. In his absence the Spartans again took the lead, and at the fatal battle of Ægos entirely subdued the Athenian power. Alcibiades, though an exile, endeavoured to restore the power of his country; of which the Spartans having intelligence, procured him to be assassinated. He was a man of admirable accomplishments, but indifferently principled; of great parts, and of an amazing versatility of genius.

ALCINOUS, king of the Phæacians, in the island now called Corfu, was son of Nausithous, and grandson of Neptune and Peribœa. It is by his gardens that this king has chiefly immortalized his memory. He received Ulysses with much civility, when a storm had cast him on his coast. The people here loved pleasure and good cheer, yet were skilful seamen; and Alcinous was a good prince.

ALCIRA, a Spanish town upon an island in the river Xucar, in the province of Valencia. It is surrounded with walls, and has two parish churches, six monasteries, one hospital, four poor-houses, and 9000 inhabitants.

ALCMAER, a city of the United Provinces, seated in North Holland, about four miles from the sea, 15 from Haerlem, and 18 from Amsterdam. The streets and houses are extremely neat and regular, and the public buildings very beautiful. It had formerly two parish churches, dedicated to St Matthew and St Lawrence. The latter had so high a tower, that it served for a seamark to the vessels that were in the open sea; but in 1464 it tumbled down, and damaged the other church so much that they were both demolished in 1670, and one church was built in their stead, dedicated to the same saints. The Spaniards, under the command of Frederick of Toledo, son of the duke of Alva, came to besiege it, after they had taken Haerlem in 1573; but were forced to raise the siege after lying three months before it, as well on account of the infection of the air, as the stout resistance of the inhabitants and soldiers; even the women signalizing themselves bravely in its defence. It is recorded in the register of this city, that, in the year 1637, 120 tulips, with the offsets, sold for 90,000 florins. The town has a very great trade in butter and cheese. It was taken by the British in 1799, but soon abandoned. Long. 4. 26. E. Lat. 52. 28. N.

ALCMAN, a lyric poet, who flourished in the 27th Olympiad, about 670 years before Christ. He was born at Sparta, and composed several poems, of which only some fragments are remaining, quoted by Athenæus and some other ancient writers. He was very amorous, accounted the father of gallant poesy, and is said to have been the first that introduced the custom of singing love-songs in company. He is reported to have been one of the greatest eaters of his age; upon which Mr Bayle remarks, that such a quality would have been extremely inconvenient, if poetry had been at that time upon such a footing as it has been often since, not able to procure the poet bread. He died of a strange disease, for he was eaten up with lice.

ALCMANIAN, in ancient lyric poetry, a kind of verse, consisting of two dactyles and two trochees: as,—

Virgini|bus pue|risque canto.

The word is formed from *Alcman*, the name of an ancient Greek poet in great esteem for his erotics or amorous compositions.

ALCMENA, the daughter of Electryo, king of Mycenæ, and wife of Amphitryon. Jupiter, putting on the shape of her husband while he was abroad in the wars, begot Hercules upon her: he made that night as long as three ordinary ones.

ALCOBAZA, a town of Portugal, to the north of Lisbon, in the province of Estremadura, at the mouth of the two rivers Alcoa and Baza. It is celebrated for its monastery, one of the richest and most splendid establishments in the kingdom. It contains 295 houses and 1500 inhabitants.

ALCOCK, JOHN, doctor of laws, and bishop of Ely in the reign of King Henry VII., was born at Beverley in Yorkshire, and educated at Cambridge. He was first made dean of Westminster, and afterwards appointed master of the rolls. In 1471 he was consecrated bishop of Rochester: in 1476 he was translated to the see of Worcester; and in 1486 to that of Ely, in the room of Dr John Morton, preferred to the see of Canterbury. He was a prelate of great learning and piety, and so highly esteemed by King Henry, that he appointed him lord-president of Wales, and afterwards lord-chancellor of England. Alcock founded a school at Kingston-upon-Hull, and built the spacious hall belonging to the episcopal palace at Ely. He was also the founder of Jesus College in Cambridge, for a master, six fellows, and as many scholars. This house was formerly a nunnery, dedicated to St Radigund; and, as Godwin tells us, the building being greatly decayed, and the revenues reduced almost to nothing, the nuns had all forsaken it, except two; whereupon Bishop Alcock procured a grant from the crown, and converted it into a college. But Camden and others tell us, that the nuns of that house were so notorious for their incontinence, that King Henry VII. and Pope Julius II. consented to its dissolution: Bale accordingly calls this nunnery *spiritualium meretricum coenobium*, a community of spiritual harlots. Bishop Alcock wrote several pieces, among which are the following:—1. Mons Perfectionis; 2. In Psalmos Pœnitentiales; 3. Homiliæ Vulgares; 4. Meditationes Piæ. He died October 1. 1500, and was buried in the chapel he had built at Kingston-upon-Hull.

ALCOENTRE, a town of Portugal, in the province of Estremadura. It is within the lines of Torres Vedras, and was occupied by the allied troops as cantonments during the important period when those lines were the barrier that secured the safety of the peninsula.

ALCOHOL, or ALKOOL, in *Chemistry*, spirits of wine highly rectified. It is also used for any highly rectified spirit.

ALCOHOL is also used for any fine impalpable powder.

ALCOHOLIZATION, the process of rectifying any spirit. It is also used for pulverization.

ALCOOMETER, or ALKOOMETER, a name given by Richter to the hydrometer with a graduated stalk. See ARÆOMETER.

ALCOR, the name of a small star adjoining to the large bright one in the middle of the tail of *Ursa major*. The word is Arabic. It is a proverb among the Arabians, applied to one who pretends to see small things, but overlooks much greater: *Thou canst see Alcor, and yet not see the full moon.*

ALCORA, a town of Spain, in the province of Valencia. It is situated on a small river that runs into the Mijares, and is principally to be noted for its potteries, in which earthenware of various kinds and china are extensively manufactured. It contains 2400 inhabitants, and is situated in lat. 42. 2. N.

ALCORAN, or AL-KORAN, the scripture or bible of the Mahometans. The word is compounded of the Arabic particle *al*, and *coran* or *koran*, derived from the verb *caraa* or *karaa*, to read. It therefore properly signifies *the reading*, or rather *that which ought to be read*. By this name the Mahometans denote not only the entire book or volume of the Koran, but also any particular chapter or section of it; just as the Jews call either the whole Scripture, or any part of it, by the name of *Karah* or *Mikra*, words of the same origin and import.

Besides this peculiar name, the Koran is also honoured with several appellations common to other books of Scripture: as *al Farkan*, from the verb *faraka*, to divide or distinguish; not, as the Mahometan doctors say, because those books are divided into chapters or sections, or distinguish between good and evil, but in the same notion that the Jews use the word *Perek* or *Pirka*, from the same root, to denote a section or portion of Scripture. It is also called *al Moshaf*, the volume, and *al Kitab*, the book, by way of eminence, which answers to the *Biblia* of the Greeks; and *al Dhikr*, the admonition, which name is also given to the Pentateuch and Gospel.

The Koran is divided into 114 larger portions of very unequal length, which we call *chapters*, but the Arabians *sowar*, in the singular *sura*, a word rarely used on any other occasion, and properly signifying a row, order, or a regular series; as a course of bricks in a building, or a rank of soldiers in an army; and is the same in use and import with the Sura or Tora of the Jews, who also call the fifty-three sections of the Pentateuch *Sedarim*, a word of the same signification.

These chapters are not distinguished in the manuscript copies by their numerical order, but by particular titles, which are taken sometimes from a particular matter treated of, or person mentioned therein; but usually from the first word of note, exactly in the same manner as the Jews have named their *Sedarim*; though the word from which some chapters are denominated be very far distant, towards the middle, or perhaps the end of the chapter; which seems ridiculous. But the occasion of this appears to have been, that the verse or passage wherein such word occurs was, in point of time, revealed and committed to writing before the other verses of the same chapter which precede it in order; and the title being given to the chapter before it was completed, or the passages reduced to their present order, the verse from whence such title was taken did not always happen to begin the chapter. Some chapters have two or more titles, occasioned by the difference of the copies.

Some of the chapters having been revealed at Mecca, and others at Medina, the noting of this difference makes a part of the title: but the reader will observe that several of the chapters are said to have been revealed partly at Mecca and partly at Medina; and as to others, it is yet a dispute among the commentators to which of the two places they belong.

Every chapter is subdivided into smaller portions, of very unequal length also, which we customarily call *verses;* but the Arabic word is *ayat*, the same with the Hebrew *ototh*, and signifies *signs* or *wonders:* such as are the secrets of God, his attributes, works, judgments, and ordinances, delivered in those verses; many of which have their particular titles also, imposed in the same manner as those of the chapters.

Besides these unequal divisions of chapter and verse, the Mahometans have also divided their Koran into sixteen equal portions, which they call *Ahzab*, in the singular *Hizb*, each divided into four equal parts; which is also an imitation of the Jews, who have an ancient division of their Mishna into sixty portions called *Massictoth*. But the Koran is more usually divided into thirty sections only, named *Ajza*, from the singular *Joz*, each of twice the length of the former, and in like manner subdivided into four parts. These divisions are for the use of the readers of the Koran in the royal temples, or in the adjoining chapels, where the emperors and great men are interred. There are thirty of these readers belonging to every chapel, and each reads his section every day; so that the whole Koran is read over once a day.

Next after the title, at the head of every chapter, except only the ninth, is prefixed the following solemn form, by the Mahometans called the *Bismallah*, IN THE NAME OF THE MOST MERCIFUL GOD; which form they constantly place at the beginning of all their books and writings in general, as a peculiar mark or distinguishing characteristic of their religion, it being counted a sort of impiety to omit it. The Jews, for the same purpose, make use of the form, *In the name of the* LORD, or, *In the name of the great* GOD; and the eastern Christians that of *In the name of the Father, and of the Son, and of the Holy Ghost.* But Mahomet probably took this form, as he did many other things, from the Persian Magi, who used to begin their books in these words, *Benam Yezdan bakshaishgher dadar;* that is, *In the name of the most merciful just* GOD.

There are twenty-nine chapters of the Koran which have this peculiarity, that they begin with certain letters of the alphabet, some with a single one, others with more. These letters the Mahometans believe to be the peculiar marks of the Koran, and to conceal several profound mysteries, the certain understanding of which, the most intelligent confess, has not been communicated to any mortal, their prophet only excepted. Notwithstanding which, some will take the liberty of guessing at their meaning by that species of Cabala called by the Jews *Notarikon*, and suppose the letters to stand for as many words, expressing the names and attributes of God, his works, ordinances, and decrees; and therefore these mysterious letters, as well as the verses themselves, seem in the Koran to be called *signs*. Others explain the intent of these letters from their nature or organ, or else from their value in numbers, according to another species of the Jewish Cabala, called *Gematria;* the uncertainty of which conjectures sufficiently appears from their disagreement. Thus, for example, five chapters, one of which is the second, begin with these letters, A. L. M. which some imagine to stand for *Allah latiff magid*, GOD *is gracious and to be glorified;* or, *Ana li minni*, i. e. *to me and from me*, viz. belongs all perfection, and proceeds all good; or else for *Ana Allah alam, I am the most wise* GOD, taking the first letter to mark the beginning of the first word, the second the middle of the second word, and the third the last of the third word; or for *Allah, Gabriel, Mohammed*, the author, revealer, and preacher of the Koran. Others say, that as the letter A belongs to the lower part of the throat, the first of the organs of speech; L to the palate, the middle organ; and M to the lips, which are the last organ; so these letters signify that God is the beginning, middle, and end, or ought to be praised in the beginning, middle, and end, of all our words and actions: or, as the total value of those three letters, in numbers, is seventy-one, they signify, that, in the space of so many years, the religion preached in the Koran should be fully established. The conjecture of a learned Christian is at least as certain as any of the former, who supposes those letters were set there by the amanuensis, for *Amar li Mohamed*, i. e. *at the command of Mohammed*, as the five letters prefixed to the nineteenth chapter seem to be there written by a Jewish scribe, for *Coh yaas, Thus he commanded.*

The Koran is universally allowed to be written with the utmost elegance and purity of language, in the dialect of the tribe of Koreish, the most noble and polite of all the Arabians, but with some mixture, though very rarely, of other dialects. It is confessedly the standard of the Arabic tongue, and, as the more orthodox believe and are taught by the book itself, inimitable by any human pen (though some sectaries have been of another opinion), and therefore insisted on as a permanent miracle, greater than that of raising the dead, and alone sufficient to convince the world of its divine original.

And to this miracle did Mahomet himself chiefly appeal for the confirmation of his mission, publicly challenging the most eloquent men in Arabia, which was at that time stocked with thousands whose sole study and ambition it was to excel in elegance of style and composition, to produce even a single chapter that might be compared with it.[1]

To the pomp and harmony of expression some ascribe all the force and effect of the Alcoran, which they consider as a sort of music, equally fitted with other species of that art to ravish and amaze. In this Mahomet succeeded so well, and so strangely captivated the minds of his audience, that several of his opponents thought it the effect of witchcraft and enchantment, as he himself complains. Others have attributed the effect of the Alcoran to the frequent mention of rewards and punishments,—heaven and hell occurring almost in every page. Some suppose that the sensual pleasures of paradise, so frequently set before the imaginations of the readers of the Alcoran, were what chiefly bewitched them; though, with regard to these, there is a great dispute whether they are to be understood literally or spiritually. Several have even allegorized the whole book.

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[1] As the composition and arrangement of words, however, admit of infinite varieties, it can never be absolutely said that any one is the best possible. In fact, Hamzah Benahmed wrote a book against the Alcoran with at least equal elegance; and Muselema another, which even surpassed it, and occasioned a defection of a great part of the Mussulmans. (*Journ. de Sçav.* tom. xiii. p. 200. *Œuv. de Sçav.* Nov. 1708, p. 404.)

The general design of the Koran was to unite the professors of the three different religions then followed in the populous country of Arabia (who for the most part lived promiscuously, and wandered without guides, the far greater number being idolaters, and the rest Jews and Christians mostly of erroneous and heterodox belief) in the knowledge and worship of one God, under the sanction of certain laws, and the outward signs of ceremonies partly of ancient and partly of novel institution, enforced by the consideration of rewards and punishments both temporal and eternal, and to bring them all to the obedience of Mahomet, as the prophet and ambassador of God, who, after the repeated admonitions, promises, and threats of former ages, was at last to establish and propagate God's religion on earth, and to be acknowledged chief pontiff in spiritual matters, as well as supreme prince in temporal.

The great doctrine, then, of the Koran is the unity of God, to restore which point, Mahomet pretended, was the chief end of his mission; it being laid down by him as a fundamental truth, that there never was, nor ever can be, more than one true orthodox religion. For, though the particular laws or ceremonies are only temporary, and subject to alteration, according to the divine directions, yet the substance of it being eternal truth, is not liable to change, but continues immutably the same. And he taught, that whenever this religion became neglected, or corrupted in essentials, God had the goodness to re-inform and re-admonish mankind thereof, by several prophets, of whom Moses and Jesus were the most distinguished, till the appearance of Mahomet, who is their seal, and no other to be expected after him. The more effectually to engage people to hearken to him, great part of the Koran is employed in relating examples of dreadful punishments formerly inflicted by God on those who rejected and abused his messengers; several of which stories, or some circumstances of them, are taken from the Old and New Testaments, but many more from the apocryphal books and traditions of the Jews and Christians of those ages, set up in the Koran as truths in opposition to the Scriptures, which the Jews and Christians are charged with having altered; and indeed few or none of the relations or circumstances in the Koran were invented by Mahomet, as is generally supposed, it being easy to trace the greater part of them much higher, as the rest might be, were more of those books extant, and were it worth while to make the inquiry.

The rest of the Alcoran is taken up in prescribing necessary laws and directions, frequent admonitions to moral and divine virtues, the worship and reverence of the Supreme Being, and resignation to his will. One of their most learned commentators distinguishes the contents of the Alcoran into *allegorical* and *literal*: under the former are comprehended all the obscure, parabolical, and enigmatical passages, with such as are repealed or abrogated; under the latter, such as are clear and in full force.

The most excellent moral in the whole Alcoran, interpreters say, is that in the chapter *Al Alraf*, viz. "Show mercy, do good to all, and dispute not with the ignorant;" or, as Mr Sale renders it, "Use indulgence, command that which is just, and withdraw far from the ignorant." Mahomet, according to the authors of the *Keschaf*, having begged of the angel Gabriel a more ample explication of this passage, received it in the following terms: "Seek him who turns thee out, give to him who takes from thee, pardon him who injures thee; for God will have you plant in your souls the roots of his chief perfections." It is easy to see that this commentary is copied from the gospel. In reality, the necessity of forgiving enemies, though frequently inculcated in the Alcoran, is of a later date among the Mahometans than among the Christians; among those latter, than among the heathens; and to be traced originally among the Jews. (See Exodus xxiii. 4, 5.) But it matters not so much who had it first, as who observes it best. The caliph Hassan, son of Hali, being at table, a slave unfortunately let fall a dish of meat reeking hot, which scalded him severely. The slave fell on his knees, rehearsing these words of the Alcoran, "Paradise is for those who restrain their anger." "I am not angry with thee," answered the caliph. "And for those who forgive offences against them," continues the slave. "I forgive thee thine," replies the caliph. "But, above all, for those who return good for evil," adds the slave. "I set thee at liberty, rejoined the caliph; and I give thee ten dinars."

There are also a great number of occasional passages in the Alcoran, relating only to particular emergencies. For, in the piecemeal method of receiving his revelation, Mahomet had this advantage, that whenever he happened to be perplexed and gravelled with any thing, he had a certain resource in some new morsel of revelation. It was an admirable contrivance of his to bring down the whole Alcoran at once only to the lowest heaven, not to earth; since, had the whole been published at once, innumerable objections would have been made, which it would have been impossible for him to solve; but as he received it by parcels, as God saw fit they should be published for the conversion and instruction of the people, he had a sure way to answer all emergencies, and to extricate himself with honour from any difficulty which might occur.

It is the general and orthodox belief among the Mahometans that the Koran is of divine original; nay, that it is eternal and uncreated, remaining, as some express it, in the very essence of God; that the first transcript has been from everlasting by God's throne, written on a table of vast bigness, called the *preserved table*, in which are also recorded the divine decrees past and future; that a copy from this table, in one volume on paper, was by the ministry of the angel Gabriel sent down to the lowest heaven, in the month of Ramadan, on the night of *power*; from whence Gabriel revealed it to Mahomet by parcels, some at Mecca, and some at Medina, at different times, during the space of 23 years, as the exigency of affairs required; giving him, however, the consolation to show him the whole (which they tell us was bound in silk, and adorned with gold and precious stones of paradise) once a year; but in the last year of his life he had the favour to see it twice. They say, that few chapters were delivered entire, the greater part being revealed piecemeal, and written down from time to time by the prophet's amanuensis in such a part of such and such a chapter till they were completed, according to the directions of the angel. The first parcel that was revealed is generally agreed to have been the first five verses of the 46th chapter.

After the new-revealed passages had been from the prophet's mouth taken down in writing by his scribe, they were published to his followers, several of whom took copies for their private use, but the far greater number got them by heart. The originals, when returned, were put promiscuously into a chest, observing no order of time; for which reason it is uncertain when many passages were revealed.

When Mahomet died, he left his revelations in the same disorder, and not digested into the method, such as it is, in which we now find them. This was the work of his successor Abu Becr, who, considering that a great number of passages were committed to the memory of Mahomet's followers, many of whom were slain in their wars, ordered the whole to be collected, not only from the palm-leaves and skins on which they had been written, and which were kept between two boards or covers, but also from the mouths of such as had gotten them by heart. And this transcript, when completed, he committed to the custody of Hassa, the daughter of Omar, one of the prophet's widows.

From this relation it is generally imagined that Abu Becr was really the compiler of the Koran, though, for aught that appears to the contrary, Mahomet left the chapters complete as we now have them, excepting such passages as his successor might add or correct from those who had gotten them by heart; what Abu Becr did else being perhaps no more than to range the chapters in their present order, which he seems to have done without any regard to time, having generally placed the longest first.

However, in the 30th year of the Hegira, Othman being then caliph, and observing the great disagreement in the copies of the Koran in the several provinces of the empire,—those of Irak, for example, following the reading of Abu Musa al Ashari, and the Syrians that of Macdad Ebn Aswad,—he, by the advice of the *companions*, ordered a great number of copies to be transcribed from that of Abu Becr, in Hassa's care, under the inspection of Zeid Ebn Thabet, Abd'allah Ebn Zobair, Said Ebn al As, and Abd'alrahman Ebn al Hareth the Makhzumite; whom he directed, that wherever they disagreed about any word, they should write it in the dialect of the Koreish, in which it was at first delivered. These copies, when made, were dispersed in the several provinces of the empire, and the old ones burnt and suppressed. Though many things in Hassa's copy were corrected by the above-mentioned revisers, yet some few various readings still occur.

"The most prominent feature of the Koran, that point of excellence in which the partiality of its admirers has ever delighted to view it, is the sublime notion it generally impresses of the nature and attributes of God. If its author had really derived these just conceptions from the inspiration of that Being whom they attempt to describe, they would not have been surrounded, as they now are on every side, with error and absurdity. But it might easily be proved, that whatever it justly defines of the Divine attributes, was borrowed from our Holy Scripture; which even from its first promulgation, but especially from the completion of the New Testament, has extended the views and enlightened the understandings of mankind; and thus furnished them with arms, which have too often, though ineffectually, been turned against itself by its ungenerous enemies.

"In this instance particularly, the copy is far below the great original, both in the propriety of its images and the force of its descriptions. Our Holy Scriptures are the only compositions that can enable the dim sight of mortality to penetrate into the invisible world, and to behold a glimpse of the Divine perfections. Accordingly, when they would represent to us the happiness of heaven, they describe it, not by any thing minute and particular, but by something general and great,—something that, without descending to any determinate object, may at once by its beauty and immensity excite our wishes and elevate our affections. Though in the prophetical and evangelical writings the joys that shall attend us in a future state are often mentioned with ardent admiration, they are expressed rather by allusion than similitude, rather by indefinite and figurative terms than by any thing fixed and determinate. 'Eye hath not seen, nor ear heard, neither have entered into the heart of man, the things which God hath prepared for them that love him.' (1 *Cor.* ii. 9.) What a reverence and astonishment does this passage excite in every hearer of taste and piety! What energy, and at the same time what simplicity, in the expression! How sublime, and at the same time how obscure, is the imagery!

"Different was the conduct of Mahomet in his descriptions of heaven and of paradise. Unassisted by the necessary influence of virtuous intentions and divine inspiration, he was neither desirous, nor indeed able, to exalt the minds of men to sublime conceptions or to rational expectations. By attempting to explain what is inconceivable, to describe what is ineffable, and to materialize what in itself is spiritual, he absurdly and impiously aimed to sensualize the purity of the Divine essence. Thus he fabricated a system of incoherence, a religion of depravity, totally repugnant indeed to the nature of that Being who, as he pretended, was its object; but therefore more likely to accord with the appetites and conceptions of a corrupt and sensual age.

"That we may not appear to exalt our Scriptures thus far above the Koran by an unreasonable preference, we shall produce a part of the second chapter of the latter, which is deservedly admired by the Mahometans, who wear it engraved on their ornaments, and recite it in their prayers. 'God! there is no God but he; the living, the self-subsisting: neither slumber nor sleep seizeth on him: to him belongeth whatsoever is in heaven and on earth. Who is he that can intercede with him but through his good pleasure? He knoweth that which is past, and that which is to come. His throne is extended over heaven and earth, and the preservation of both is to him no burden. He is the high, the mighty.'" (*Sale's Kor.* ii. p. 30. 4to edit.)

ALCORAN is also figuratively applied to certain other books full of impieties and impostures. In this sense we meet with the Alcoran of the Cordeliers, which has made a great noise; wherein St Francis is extravagantly magnified, and put on a level with Jesus Christ. The Alcoran of the Cordeliers is properly an extract of a very scarce book, entitled *The Conformity of the Life of the seraphic father St Francis with the Life of Christ*, published in 1510, 4to; since at Bologna in folio. Erasmus Albertus, being by the elector of Brandenburg appointed to visit a monastery of Franciscans, found this book; and being struck with the extreme folly and absurdity of it, collected a number of curiosities out of it, and published them under the title of the *Alcoran* of the Franciscans, with a preface by Martin Luther.

ALCORANISTS, among *Mahometans*, those who adhere strictly to the letter or text of the Alcoran, from an opinion of its ultimate sufficiency and perfection. The Persians are generally *Alcoranists*, as admitting the Alcoran alone for their rule of faith. The Turks, Tartars, Arabs, &c. besides the Alcoran, admit a multitude of traditions. The Alcoranists, among Mahometans, amount to much the same with the Textuaries among the Jews. The Alcoranists can find nothing excellent out of the Alcoran; are enemies of philosophers, metaphysicians, and scholastic writers. With them the Alcoran is every thing.

ALCOVE, in *Architecture*, a recess, or part of a chamber separated by an estrade or partition of columns, and other corresponding ornaments, in which is placed a bed of state, and sometimes seats to entertain company. These alcoves are frequent in Spain, and the bed is raised two or three ascents, with a rail at the foot.

ALCOY, a Spanish city on the sea-coast, in the province of Valencia. It has one parish church, three monasteries, and 14,600 inhabitants. It has a manufactory for fine cloth, a soap-boiling house, and a very large manufactory for paper, which employs 48 mills.

ALCUINUS, FLACCUS, an ecclesiastic of the eighth century. He was born, it is supposed, in Yorkshire. He was educated, however, at York, under the direction of Archbishop Egbert, as we learn from his own letters, in which he frequently calls that great prelate his beloved master, and the clergy of York the companions of his youthful studies. As he survived Venerable Bede about 70 years, it is hardly possible that he could have received any part of his education under him, as some writers of literary history have affirmed; and it is worthy of observation, that he never calls that great man his master, though he speaks of him with the highest veneration. It is not well known to what preferments he had attained in the church before he left England, though some say he was abbot of Canterbury. The occasion of his leaving his native country was his being sent on an embassy by Offa, king of Mercia, to the emperor Charlemagne, who contracted so great an esteem and friendship for him, that he earnestly solicited, and at length prevailed upon him, to settle in his court, and become his preceptor in the sciences. Alcuinus accordingly instructed that great prince in rhetoric, logic, mathematics, and divinity, which rendered him one of his greatest favourites. "He was treated with so much kindness and familiarity," says a contemporary writer, "by the emperor, that the other courtiers called him, by way of eminence, the *emperor's delight.*" Charlemagne employed his learned favourite to write several books against the heretical opinions of Felix, bishop of Urgel, in Catalonia, and to defend the orthodox faith against that heresiarch, in the council of Frankfort, A. D. 794; which he performed to the entire satisfaction of the emperor and council, and even to the conviction of Felix and his followers, who abandoned their errors. The emperor consulted chiefly with Alcuinus on all things relating to religion and learning, and by his advice did many great things for the advancement of both. An academy was established in the imperial palace, over which Alcuinus presided, and in which the princes and prime nobility were educated; and other academies were established in the chief towns of Italy and France, at his instigation, and under his inspection. "France," says one of our best writers of literary history, "is indebted to Alcuinus for all the polite learning it boasted of in that and the following ages. The universities of Paris, Tours, Fulden, Soissons, and many others, owe to him their origin and increase, those of whom he was not the superior and founder being at least enlightened by his doctrine and example, and enriched by the benefits he procured for them from Charlemagne." After Alcuinus had spent many years in the most intimate familiarity with the greatest prince of his age, he at length, with great difficulty, obtained leave to retire from court to his abbey of St Martin, at Tours. Here he kept up a constant correspondence by letters with Charlemagne, from which it appears that both the emperor and his learned friend were animated with the most ardent love to learning and religion, and constantly employed in contriving and executing the noblest designs for their advancement. He composed many treatises on a great variety of subjects, in a style much superior in purity and elegance to that of the generality of writers in the age in which he flourished. Charlemagne often solicited him, with all the warmth of a most affectionate friend, to return to court, and favour him with his company and advice; but he still excused himself, and nothing could draw him from his retirement in his abbey of St Martin in Tours, where he died A. D. 804. His works were collected and published by Andrew du Chesne, in one volume folio, Paris, 1617. They consist of, 1. Tracts upon Scripture; 2. Tracts upon doctrine, discipline, and morality; 3. Historical treatises, letters, and poems. Since that edition there has been published an incredible number of tracts, poems, &c. ascribed to this author, most of which, in all probability, were not his.

ALCYONIUM, an obsolete name of a submarine plant. It is also used for a kind of coral or astroites, frequently found fossil in England.

ALCYONIUM *Stagnum*, in *Ancient Geography*, a lake in the territory of Corinth, whose depth was unfathomable, and in vain attempted to be discovered by Nero. Through this lake Bacchus is said to have descended to hell to bring back Semele. (Pausanias.)

ALCYONIUS, PETER, a learned Italian, who flourished in the 16th century. He was well versed in the Greek and Latin tongues, and wrote some pieces of eloquence which met with great approbation. He was corrector of the press a considerable time for Aldus Manutius, and is entitled to a share in the praises given to the editions of that learned printer. He published a treatise concerning banishment, which contained so many fine passages intermixed with others quite the reverse, that it was thought he had tacked to something of his own, several fragments of a treatise of *Cicero de Gloria;* and that afterwards, in order to save himself from being detected in this theft, he burnt the manuscript of Cicero, the only one extant. Paulus Manutius, in his commentary upon these words of Cicero, *Librum tibi celeriter mittam de gloria,* "I will speedily send you my treatise on Glory," has the following passage relating to this affair: "He means," says he, "his two books on Glory, which were handed down to the age of our fathers; for Bernard Justinian, in the index of his books, mentions *Cicero de Gloria.* This treatise, however, when Bernard had left his whole library to a nunnery, could not be found, though sought after with great care, nobody doubted but Peter Alcyonius, who, being physician to the nunnery, was intrusted with the library, had basely stolen it. And, truly, in his treatise of Banishment, some things are found interspersed here and there, which seem not to savour of Alcyonius, but of some higher author." The two orations he made after the taking of Rome, wherein he represented very strongly the injustice of Charles V. and the barbarity of his soldiers, were excellent pieces. There is also an oration ascribed to him, on the knights who died at the siege of Rhodes.

ALDBOROUGH, a market-town in the hundred of Plomsgate, in the county of Suffolk. It formerly returned two members to parliament, who were nominally chosen by the owners of burgage houses, but in fact by the Marquis of Hertford. It is a poor place, chiefly inhabited by fishermen. It has a market on Wednesdays and Saturdays. It is distant 94 miles from London. The population in 1811 amounted to 1060, in 1821 to 1212, and in 1831 to 1341.

ALDBOROUGH, a small town in the wapentake of Clare, in the west riding of Yorkshire. It is on the river Ouse, and was formerly a Roman station, called Isurium Brigantium; and near it are some remains of a druidical temple. It formerly returned two members to parliament, who were nominally chosen by the occupiers of burgage tenures, but really by the owner of them, the Duke of Newcastle. The population in 1811 amounted to 464, in 1821 to 484, and in 1831 to 620. It is 208 miles from London.

ALDEA DEL RIO, a town of Spain, on the Guadalquivir, in the province of Cordova, with 3000 inhabitants.

ALDEBARAN, in *Astronomy*, a star of the first magnitude, called in English the *bull's eye*, as making the eye of the constellation Taurus. Its longitude is 6. 32. 9. of Gemini, and its latitude 5. 29. 40. south.

ALDERHOLM, an island of Sweden, formed by the three arms of a river running through Gefle, a town of Nordland, in Sweden, 80 miles north from Stockholm. Here is a wharf, a repository for planks and deals, two packing-houses, a large custom-house for taking toll of the ships, an arsenal for cannon, and a granary.

ALDERMAN, in the British policy, a magistrate subordinate to the lord-mayor of a city or town corporate. The number of these magistrates is not limited, but is more or less, according to the magnitude of the place. In London there are 26, each having one of the wards of the city committed to his care. This office is for life, so that when one of them dies or resigns, a wardmote is called, who return two persons, one of whom the lord-mayor and aldermen choose to supply the vacancy. All the aldermen are justices of the peace, by a charter of 15 Geo. II. The aldermen of London, &c. are exempted from serving inferior offices; nor shall they be put upon assizes, or serve on juries, so long as they continue to be aldermen.

Alderman, among our Saxon ancestors, was a degree of nobility answering to earl or count at present.

Alderman was also used in the time of King Edgar for a judge or justice. Thus we meet with the titles of *aldermannus totius Angliæ, aldermannus regis, comitatis, civitatis, burgi, castelli, hundredi sive wapentachii, et novemdecimorum.* According to Spelman, the *aldermannus totius Angliæ* seems to have been the same officer who was afterwards styled *capitalis justiciarius Angliæ*, or chief justice of England; the *aldermannus regis* seems to have been an occasional magistrate, answering to our justice of assize; and the *aldermannus comitatus*, a magistrate who held a middle rank between what was afterwards called the *earl* and the *sheriff*: he sat at the trial of causes with the bishop; the latter proceeding according to ecclesiastical law, and the former declaring and expounding the common law of the land.

ALDERNEY, an island in the British channel, subject to the crown of Great Britain. It is about eight miles in compass, and is separated from Cape la Hogue, in Normandy, by a narrow strait, called the *Race of Alderney*, which is a very dangerous passage in stormy weather, when the two currents meet; otherwise it is safe, and has depth of water for the largest ships. Through this strait the French fleet made their escape after their defeat at La Hogue in 1692. It is a healthful island, has but one church, is fruitful both in corn and pasture, and is remarkable for a fine breed of cows. The inhabitants live together in a town of the same name. It has but one harbour, called *Crabby*, which is at a good distance from the town, and is only fit for small vessels. To the west lie the range of rocks called the *Caskets*, so dangerous to mariners. Long. 2. 7. W. Lat. 49. 45. N.

ALDHELM, or Adelm, St, bishop of Shireburn in the time of the Saxon Heptarchy. He is said to have been the son of Kenred, brother to Ina, king of the West Saxons; but in the opinion of William of Malmesbury, his father was no more than a distant relation to the king. Having received the first part of his education in the school which one Maldulph, a learned Scot, had set up in the place where Malmesbury now stands, he travelled into France and Italy for his improvement. At his return home he studied some time under Adrian, abbot of St Augustin's, in Canterbury, the most learned professor of the sciences who had ever been in England. In these different seminaries he acquired a very uncommon stock of knowledge, and became famous for his learning, not only in England, but in foreign countries; whence several learned men sent him their writings for his perusal and correction; particularly Prince Arcivil, a son of the king of Scotland, who wrote many pieces, which he sent to Aldhelm, "entreating him to give them the last polish, by rubbing off their Scotch rust." He was the first Englishman who wrote in the Latin language, both in prose and verse, and composed a book for the instruction of his countrymen in the prosody of that language. Besides this, he wrote several other treatises on various subjects, some of which are lost, and others published by Martin Delrio and Canisius. Venerable Bede, who flourished in the end of this and the beginning of the next century, gives the following character of Aldhelm: "He was a man of universal erudition, having an elegant style, and being wonderfully well acquainted with books, both on philosophical and religious subjects." In fact, considering the cloud of ignorance by which he was surrounded, and the great difficulty of acquiring knowledge without proper instruction, Aldhelm was a very extraordinary man. From one of his letters to Hedda, bishop of Winchester, concerning the nature of his studies whilst at Canterbury, he appears to have been indefatigably determined to acquire every species of learning in his power. For a copy of this curious epistle, see Henry's *History*, vol. ii. p. 320. King Alfred the Great declared that Aldhelm was the best of all the Saxon poets; and that a favourite song, which was universally sung in his time, near 200 years after its author's death, was of his composition. When he was abbot of Malmesbury, having a fine voice, and great skill in music as well as poetry, and observing the backwardness of his barbarous countrymen to listen to grave instructions, he composed a number of little poems, which he sung to them after mass in the sweetest manner, by which they were gradually instructed and civilized. After this excellent person had governed the monastery of Malmesbury, of which he was the founder, about 30 years, he was made bishop of Shireburn, where he died A. D. 709.—He wrote, 1. De octo Vitiis principalibus. This treatise is extant in the *Bibliotheca Patrum* of Canisius. 2. Ænigmatum versus mille. This, with several others of his poems, was published by Martin Delrio at Mentz, 1601, 8vo. 3. A book addressed to a certain king of Northumberland, named Alfrid, on various subjects. 4. De Vita Monachorum. 5. De Laude Sanctorum. 6. De Arithmetica. 7. De Astrologia. 8. A book against the mistake of the Britons concerning the celebration of Easter; printed by Sonius, 1576. 9. De Laude Virginitatis; manuscript, in Bennet College, Cambridge; published among Bede's *Opuscula*. Besides many sonnets, epistles, and homilies in the Saxon language.

ALDPORT, an ancient name for Manchester.

ALDRED, abbot of Tavistock, was promoted to the bishopric of Worcester in the year 1046. He was so much in favour with King Edward the Confessor, and had so much power over his mind, that he obliged him to be reconciled with the worst of his enemies, particularly with Sweyn, son of Earl Godwin, who had revolted against him, and came with an army to invade the kingdom. Aldred also restored the union and friendship between King Edward and Griffith, king of Wales. He took afterwards a journey to Rome, and being returned into England, in the year 1054 he was sent ambassador to the emperor Henry II. He staid a whole year in Germany, and was very honourably entertained by Herman, archbishop of Cologne, from whom he learned many things relating to ecclesiastical discipline, which on his return he established in his own diocese. In the year 1058 he went to Jerusalem, which no archbishop or bishop of England had ever done before him. Two years after, he returned to England; and Kinsius, archbishop of York, dying the 22d of December 1060, Aldred was elected in his stead on

Christmas-day following, and was permitted to retain the see of Worcester with the archbishopric of York, as some of his predecessors had done. Aldred went soon after to Rome, in order to receive the pall from the pope: he was attended by Toston, earl of Northumberland, Giso, bishop of Wells, and Walter, bishop of Hereford. The pope received Toston very honourably, and made him sit by him in the synod which he held against the simonists. He granted to Giso and Walter their request, because they were tolerably well learned, and not accused of simony. But Aldred being by his answers found ignorant, and guilty of simony, the pope deprived him very severely of all his honours and dignities, so that he was obliged to return without the pall. On the way home he and his three fellow-travellers were attacked by some robbers, who took from them all that they had, though they did not offer to kill them. This obliged them to return to Rome; and the pope, either out of compassion, or by the threatenings of the earl of Northumberland, gave Aldred the pallium; but he was obliged to resign his bishopric of Worcester. However, as the archbishopric of York had been almost entirely ruined by the many invasions of foreigners, King Edward gave the new archbishop leave to keep 12 villages or manors which belonged to the bishopric of Worcester. Edward the Confessor dying in 1066, Aldred crowned Harold, his successor. He also crowned William the Conqueror, after he had made him take the following oath, viz. that he would protect the holy churches of God and their leaders; that he would establish and observe righteous laws; that he would entirely prohibit and suppress all rapines and unjust judgments. He was so much in favour with the Conqueror, that this prince looked upon him as a father; and though imperious in regard to every body else, he yet submitted to obey this archbishop. John Brompton gives us an instance of the king's submission, which at the same time shows the prelate's haughtiness. It happened one day as the archbishop was at York, that the deputy-governor or lord-lieutenant, going out of the city with a great number of people, met the archbishop's servants, who came to town with several horses and carts loaded with provisions. The governor asked them to whom they belonged; and they having answered they were Aldred's servants, the governor ordered that all these provisions should be carried to the king's storehouse. The archbishop sent immediately some of his clergy to the governor, commanding him to deliver the provisions, and to make satisfaction to St Peter, and to him the saint's vicar, for the injury he had done them; adding, that if he refused to comply, the archbishop would make use of his apostolic authority against him (intimating thereby that he would excommunicate him). The governor, offended at this proud message, used the persons whom the archbishop had sent him very ill, and returned an answer as haughty as the message was. Aldred thereupon went to London to make his complaint to the king; but in this very complaint he acted with his wonted insolence; for meeting the king in the church of St Peter at Westminster, he spoke to him in these words: "Hearken, O William: when thou wast but a foreigner, and God, to punish the sins of this nation, permitted thee to become master of it, after having shed a great deal of blood, I consecrated thee, and put the crown upon thy head with blessings; but now, because thou hast deserved it, I pronounce a curse over thee, instead of a blessing, since thou art become the persecutor of God's church, and of his ministers, and hast broken the promises and the oaths which thou madest to me before St Peter's altar." The king, terrified at this discourse, fell upon his knees, and humbly begged the prelate to tell him by what crime he had deserved so severe a sentence. The noblemen who were present were enraged against the archbishop, and loudly cried out he deserved death, or at least banishment, for having offered such an injury to his sovereign; and they pressed him with threatenings to raise the king from the ground. But the prelate, unmoved at all this, answered calmly, "Good men, let him lie there, for he is not at Aldred's but at St Peter's feet; he must feel St Peter's power, since he dared to injure his vicegerent." Having thus reproved the nobles by his episcopal authority, he vouchsafed to take the king by the hand, and to tell him the ground of his complaint. The king humbly excused himself, by saying he had been ignorant of the whole matter; and begged of the noblemen to entreat the prelate that he might take off the curse he had pronounced, and to change it into a blessing. Aldred was at last prevailed upon to favour the king thus far; but not without the promise of several presents and favours, and only after the king had granted him to take such a revenge on the governor as he thought fit. Since that time (adds the historian) none of the noblemen ever dared to offer the least injury. It may be questioned which was more surprising here, whether the archbishop's haughtiness, who dared to treat his sovereign after so unbecoming a manner, or the king's stupidity, who suffered such insolence and audaciousness from a priest. The Danes having made an invasion in the north of England in the year 1068, under the conduct of Harold and Canute, the sons of King Sweyn, Aldred was so much afflicted at it, that he died of grief the 11th of September in that same year, having besought God that he might not see the desolation of his church and country.

ALDRICH, Robert, bishop of Carlisle, was born at Burnham, in Buckinghamshire, about the year 1493, and educated at Eaton school, from whence, in 1507, he was elected scholar of King's College, Cambridge, where he took his degree in arts, and was afterwards proctor of the university. In 1525 he was appointed master of Eaton school, then became fellow of that college, and finally provost. In 1529 he went to Oxford, where, being first incorporated bachelor of divinity, in the following year he proceeded doctor in that faculty. In 1531 he was made archdeacon of Colchester, in 1534 canon of Windsor, and the same year registrary of the order of the Garter. He was consecrated bishop of Carlisle in the year 1537, and died at Horncastle in Lincolnshire in 1556. He wrote, 1. Epistola ad Gul. Hormanum, in Latin verse, printed in Horman's *Antibossicon*, Lond. 1521, of which book Pitts erroneously makes Aldrich the author; 2. Epigrammata varia; 3. Latin verses, and another epistle to Horman, prefixed to the *Vulgaria Puerorum* of that author, Lond. 1519, 4to; 4. Answers to certain queries concerning the abuses of the mass, also about receiving the sacrament.

Aldrich, Dr Henry, an eminent English divine and philosopher, born at London in 1647, was educated at Westminster school under the famous Dr Busby, and admitted of Christ-church College, Oxford. He had a great share in the controversy with the Papists in the reign of James II.; and Bishop Burnet ranks him among those who examined all the points of Popery with a solidity of judgment, clearness of argument, depth of learning, and vivacity of writing, far beyond any who had before that time written in our language. He rendered himself so conspicuous, that at the Revolution, when Massey the Popish dean of Christ-church fled, his deanery was conferred on him. In this station he behaved in an exemplary manner, and that fabric owes much of its beauty to his ingenuity: it was Aldrich who designed the beautiful square called Peckwater Quadrangle, which is esteemed an excellent piece of architecture. In imitation of his predecessor Dr Fell, he published yearly a piece of some ancient Greek author, as a present to the students of his house. He published a System of Logic, with some other pieces; and the reVising of Clarendon's History of the Rebellion was intrusted to him and Bishop Sprat. Besides his preferments above mentioned, Dr Aldrich was also rector of Wem, in Shropshire. He was chosen prolocutor of the convocation in 1702. This worthy person died at Christ-church on the 14th of December 1710. As to his character, he was a most universal scholar, and had a taste for all sorts of learning, especially architecture. Sir John Hawkins has favoured the public with several particulars relative to Dr Aldrich's skill in music; and on account of the Doctor's eminence in this respect, Sir John has given his life, with his head prefixed. His abilities as a musician rank him, we are told, among the greatest masters of the science. He composed many services for the church, which are well known; as are also his anthems, nearly to the number of 20. He adapted, with great skill and judgment, English words to many of the notes of Palestrina, Carissimi, Victoria, and other Italian composers for the church, some of which are frequently sung in our cathedrals as anthems. By the happy talent which Dr Aldrich possessed, of naturalizing the compositions of the old Italian masters, and accommodating them to an English ear, he increased the stores of our own church. Though the Doctor chiefly applied himself to the cultivation of sacred music, yet being a man of humour, he could divert himself by producing pieces of a lighter kind. There are two catches of his, the one, Hark the bonny Christ-church Bells; the other, entitled A Smoking Catch, to be sung by four men smoking their pipes, which is not more difficult to sing than diverting to hear. His love of smoking was, it seems, so excessive, as to be an entertaining topic of discourse in the university. Such was Dr Aldrich's regard for the advancement of music, and the honour of its professors, that he had formed a design of writing a history of the science; and the materials from which he proposed to compile it are yet extant in the library of his own college. It appears from these materials that he had marked down every thing which he had met with concerning music and musicians, but that he had brought no part of them into any kind of form.

Dr Aldrich is of some note as a Latin poet. In the *Musæ Anglicanæ* we find two elegant copies of verses by him; one on the accession of King William III., and the other on the death of the duke of Gloucester. Sir John Hawkins has preserved a humorous translation by him of the well-known English ballad,

A soldier and a sailor,
A tinker and a tailor, &c.

The following epigram, entitled "Causæ Bibendi," is likewise ascribed to Dr Aldrich:—

Si bene quid memini, Causæ sunt quinque bibendi;
Hospitis Adventus, præsens Sitis, atque *futura,*
Aut Vini Bonitas, aut quælibet altera Causa.

The epigram has been thus translated:—

If on my theme I rightly think,
There are five reasons why men drink;
Good wine, a friend, because I'm dry,
Or lest I should be by and by,
Or any other reason why.

The translation is not equal to the original. It is evident, from the verses cited and referred to, that Dr Aldrich was of a very cheerful and pleasant turn of mind. Indeed he is always spoken of as having been a man of wit, and as one who to his great talents and virtues joined those amiable qualities which rendered him the object of general affection, as well as of general esteem and respect. Having never been married, he appropriated his income to works of hospitality and beneficence, and encouraging learning to the utmost of his power, of which he was a most magnificent patron, as well as one of the greatest men in England, if considered as a Christian or a gentleman. He had always the interest of his college at heart, whereof he was an excellent governor. His modesty and humility prevented him from prefixing his name to the learned tracts which he published during his life. At his death he wished to be buried in the cathedral, without any memorial; which his thrifty nephew complied with, depositing him on the south side of Bishop Fell's grave, December 22, eight days after his decease, which happened in the 63d or 64th year of his age.

ALDROVANDUS, Ulysses, professor of philosophy and physic at Bologna, the place of his nativity. He was a most curious inquirer into natural history, and travelled into the most distant countries on purpose to inform himself of their natural productions. Minerals, metals, plants, and animals, were the objects of his curious researches; but he applied himself chiefly to birds, and was at a great expense to have figures of them drawn from the life. Aubert le Mire says, that he gave a certain painter, famous in that art, a yearly salary of 200 crowns, for 30 years and upwards; and that he employed at his own expense Lorenzo Bennini and Cornelius Swintus, as well as the famous engraver Christopher Coriolanus. These expenses ruined his fortune, and at length reduced him to the utmost necessity; and it is said that he died blind in an hospital at Bologna, at a great age, in 1605. Mr Bayle observes, that antiquity does not furnish us with an instance of a design so extensive and so laborious as that of Aldrovandus, with regard to natural history; that Pliny has treated of more kinds of subjects, but only touches lightly on them, saying but a little upon any thing, whereas Aldrovandus has collected all he could meet with. His compilation, or that compiled upon his plan, consists of 13 volumes in folio, several of which were printed after his death. He himself published his Ornithology, or History of Birds, in three folio volumes, in 1599; and his seven books of Insects, which make another volume of the same size. The volume of Serpents, three of Quadrupeds, one of Fishes, that of exanguious Animals, the History of Monsters, with the Supplement to that of Animals, the Treatise of Metals, and the Dendrology or History of Trees, were published at several times after the death of Aldrovandus, by the care of different persons; and Aldrovandus is the sole author only of the first six volumes of this work, the rest having been finished and compiled by others, upon the plan of Aldrovandus,—a most extensive plan, wherein he not only relates what he has read in naturalists, but remarks also what historians have written, legislators ordained, and poets feigned. He explains also the different uses which may be made of the things he treats of, in common life, in medicine, architecture, and other arts; in short, he speaks of morality, proverbs, devices, riddles, hieroglyphics, and many other things which relate to his subject.

ALDSTON-MOOR, a market-town of the Ward of Leath, in the county of Cumberland. It is on the banks of the Tyne, in a pictureaque district, abounding in mines of lead, whose produce is shipped from Hexham. It is 302 miles from London. The market is held on a Saturday. The population has been as follows: in 1811, 5079; in 1821, 5699; and in 1831, 6858.

ALE, a fermented liquor obtained from an infusion of malt, and differing from beer chiefly in having a less proportion of hops. This liquor, the natural substitute of wine in such countries as could not produce the grape, is said to have originally been made in Egypt, the first planted kingdom, on the dispersion from the East, that was supposed unable to produce grapes. And, as the Noachian colonies pierced further into the west, they found, or thought they found, the same defect, and supplied it in the same manner. Thus the natives of Spain, the inhabitants of France, and the aborigines of Britain, all used an infusion of barley for their ordinary liquor; and it was called by the various names of *Cælia* and *Ceria* in the first country, *Cerevisia* in the second, and *Curmi* in the last; all literally importing only *the strong water*.

"All the several nations," says Pliny, "who inhabit the west of Europe, have a liquor with which they intoxicate themselves, made of corn and water. The manner of making this liquor is sometimes different in Gaul, Spain, and other countries, and is called by many various names; but its nature and properties are everywhere the same. The people of Spain, in particular, brew the liquor so well that it will keep good a long time. So exquisite is the cunning of mankind in gratifying their vicious appetites, that they have thus invented a method to make water itself intoxicate." The method in which the ancient Britons and other Celtic nations made their ale is thus described by Isidorus and Orosius: "The grain is steeped in water and made to germinate, by which its spirits are excited and set at liberty; it is then dried and grinded; after which it is infused in a certain quantity of water; which, being fermented, becomes a pleasant, warming, strengthening, and intoxicating liquor." This ale was most commonly made of barley, but sometimes of wheat, oats, and millet.

Anciently the Welsh and Scots had also two kinds of ale, called *common ale* and *spiced ale;* and their value was thus ascertained by law: "If a farmer hath no mead, he shall pay two casks of spiced ale, or four casks of common ale, for one cask of mead." By this law, a cask of spiced ale, nine palms in height and eighteen palms in diameter, was valued at a sum of money equal in efficacy to L.7. 10s. of our present money; and a cask of common ale of the same dimensions at a sum equal to L.3. 15s. This is a sufficient proof that even common ale at that period was an article of luxury among the Welsh, which could only be obtained by the great and opulent. Wine seems to have been quite unknown even to the kings of Wales at that period, as it is not so much as once mentioned in their laws; though Giraldus Cambrensis, who flourished about a century after the Conquest, acquaints us that there was a vineyard in his time at Maenarper, near Pembroke, in South Wales.

Ale was the favourite liquor of the Anglo-Saxons and Danes, as it had been of their ancestors the ancient Germans. Before their conversion to Christianity, they believed that drinking large and frequent draughts of ale was one of the chief felicities which those heroes enjoyed who were admitted into the hall of Odin. See Brewing, and Licensing.

Medicated Ales, those wherein medicinal herbs have been infused or added during the fermentation.

Gill Ale is that in which the dried leaves of gill or ground-ivy have been infused. It is esteemed abstersive and vulnerary, and consequently good in disorders of the breast and obstructions of the viscera.

Ale-Conner, an officer in London, who inspects the measures used in public houses. There are four ale conners, who are all chosen by the liverymen in common-hall on Midsummer-day.

Ale-Silver, a tax paid annually to the lord-mayor of London by all who sell ale within the city.

ALEA, in *Roman Antiquity*, denotes in general all manner of games of chance, but, in a more restricted sense, was used for a particular game played with dice and tables, not unlike our backgammon.

ALEANDER, Jerome, cardinal and archbishop of Brindisi, was born in 1480, and distinguished himself at the beginning of the Reformation by the opposition he made to Luther; for being sent into Germany as the pope's nuncio in 1519, he acted, as occasion served, in the character of both ambassador and doctor, and declaimed three hours together against Luther's doctrine before the diet at Worms, but could not prevent that celebrated reformer from being heard in that diet. He published several works, and died at Rome in 1542.

Aleander, *Jerome*, nephew of the former, a learned man of the seventeenth century, born in the principality of Friuli, of the same family with the preceding. When he went to Rome, he was employed as secretary under Cardinal Octavius Bandini, and discharged this office with great honour for almost twenty years. He afterwards, by the persuasion of Urban VIII., who had a great esteem for him, became secretary to Cardinal Barberini, whom he accompanied to Rome when he went thither in the character of legate *a latere*, and in whose service he died in 1631. He was one of the first members of the Academy of Humorists, wrote a learned treatise in Italian on the device of the society, and displayed his genius on many different subjects. Barberini gave him a magnificent funeral at the academy of Humorists; the academists carried his corpse to the grave, and Gaspar de Simeonibus, one of the members, made his funeral oration.

ALECTO, one of the Furies, daughter of Acheron and Night, or, as others would have it, of Pluto and Proserpine.

ALECTORIA, a stone said to be formed in the gall-bladder of old cocks, to which the ancients ascribed many fabulous virtues. This is otherwise called *Alectorius lapis*, sometimes *Alectorolithos*, in English the *cock-stone*. The more modern naturalists hold the *alectorius lapis* to be originally swallowed down, not generated in, the stomach and gizzards of cocks and capons. It is known that many of the fowl kind make a practice of swallowing pebbles, which are supposed to be of service in the business of trituration and digestion.

ALECTOROMANTIA, in *Antiquity*, a species of divination performed by means of a cock. This is otherwise called *Alectryomancy*, of which there appear to have been different species. But that most spoken of by authors was in the following manner: a circle was described on the ground, and divided into twenty-four equal portions; in each of these spaces was written one of the letters of the alphabet, and on each of the letters was laid a grain of wheat; after which, a cock being turned loose in the circle, particular notice was taken of the grains picked up by the cock, because the letters under them, being formed into a word, made the answer desired. It was thus, according to Zonaras, that Libanius and Jamblicus sought who should succeed the emperor Valens; and the cock eating the grains answering to the spaces ΘΕΟΔ, several whose names began with those letters, as Theodotus, Theodistes, Theodulus, &c. were put to death; which did not hinder, but promote Theodosius, to the succession. But the story, however current, is but ill supported: it has been called in question by some, and refuted by others, from the silence of Marcellinus, Socrates, and other historians of that time.

ALEE, in the sea-language, a term only used when the wind, crossing or flanking the line of a ship's course, presses upon the masts and sails so as to make her incline to one side, which is called the lee-side. Hence, when the helm is moved over to this side, it is said to be *alee*, or *hard-alee*.

ALEGRETTE, a small town of Portugal, in Alentejo, on the confines of Port Alegre, on the river Caja, which falls into the Guadiana a little below Badajos, near the frontiers of Spanish Estremadura. It is a very pretty town, and finely situated; seven miles south-east of Port Alegre, and thirty north of Elvas. Long. 5. 20. W. Lat. 39. 6. N.

ALEIUS CAMPUS, in *Ancient Geography*, a plain in Cilicia, on this side the river Pyramus, near the mountain Chimera, famous for Bellerophon's wandering and perishing there, after being thrown off Pegasus; which is the reason of the appellation.

ALEMANIA, or ALLEMANIA, in *Ancient Geography*, a name of Germany, but not known before the time of the Antonines, and then used only for a part. After the Marcomanni and their allies had removed from the Rhine, a rabble or collection of people from all parts of Gaul, as the term *Alemanni* denotes, prompted either by levity or poverty, occupied the lands, called *Decumates* by Tacitus, because they held them on a tithe; now supposed to be the duchy of Wirtemberg. Such appear to have been the small beginnings of Alemania, which was in after-times greatly enlarged; but still it was considered as a distinct part; for Caracalla, who conquered the Alemanni, assumed the surname both of *Alemannicus* and *Germanicus*.

ALEMBDAR, an officer in the court of the Grand Signior, who bears the green standard of Mahomet when the sultan appears in public on any solemn occasion.

ALEMBERT, JEAN LE ROND D', an eminent French philosopher, was born at Paris in 1717. He derived the name of Jean le Rond from that of the church near which, after his birth, he was exposed as a foundling. His father, informed of this circumstance, listened to the voice of nature and duty, took measures for the proper education of his child, and for his future subsistence in a state of ease and independence.

He received his first education in the College of the Four Nations, among the Jansenists, where he gave early marks of capacity and genius. In the first year of his philosophical studies he composed a Commentary on the Epistle of St Paul to the Romans. The Jansenists considered this production as an omen that portended to the party of Port-Royal a restoration to some part of their ancient splendour, and hoped to find one day in M. d'Alembert a second Pascal. To render this resemblance more complete, they engaged their rising pupil in the study of the mathematics; but they soon perceived that his growing attachment to this science was likely to disappoint the hopes they had formed with respect to his future destination: they therefore endeavoured to divert him from this line; but their endeavours were fruitless.

On his leaving college, he found himself alone and unconnected with the world; and sought an asylum in the house of his *nurse*. He comforted himself with the hope that his fortune, though not ample, would better the condition and subsistence of that family, which was the only one that he could consider as his own. Here, therefore, he took up his residence, resolving to apply himself entirely to the study of geometry; and here he lived, during the space of forty years, with the greatest simplicity, discovering the augmentation of his means only by increasing displays of his beneficence, concealing his growing reputation and celebrity from these honest people, and making their plain and uncouth manners the subject of good-natured pleasantry and philosophical observation. His good nurse perceived his ardent activity, heard him mentioned as the writer of many books, but never took it into her head that he was a great man, and rather beheld him with a kind of compassion. "*You will never*," said she to him one day, "*be any thing but a philosopher—and what is a philosopher? —a fool, who toils and plagues himself during his life, that people may talk of him when* HE IS NO MORE."

As M. d'Alembert's fortune did not far exceed the demands of necessity, his friends advised him to think of a profession that might enable him to augment it. He accordingly turned his views to the law, and took his degrees in that line; but soon abandoned this plan, and applied to the study of medicine. Geometry, however, was always drawing him back to his former pursuits; and after many ineffectual efforts to resist its attractions, he renounced all views of a lucrative profession, and give himself over entirely to mathematics and poverty.

In the year 1741 he was admitted member of the Academy of Sciences; for which distinguished literary promotion, at such an early age, he had prepared the way by correcting the errors of a celebrated work,[1] which was deemed *classical* in France in the line of geometry. He afterwards set himself to examine, with deep attention and assiduity, what must be the motion of a body which passes from one fluid into another more dense, in a direction not perpendicular to the surface separating the two fluids. Every one knows the phenomenon which happens in this case, and which amuses children under the denomination of *Ducks and Drakes*; but M. d'Alembert was the first who explained it in a satisfactory and philosophical manner.

Two years after his election to a place in the academy he published his treatise on *Dynamics*. The new principle developed in this treatise consisted in establishing equality, at each instant, between the changes that the motion of a body has undergone, and the forces or powers which have been employed to produce them; or, to express the thing otherwise, in separating into *two parts* the action of the moving powers, and considering the *one* as producing alone the motion of the body in the second instant, and the *other* as employed to destroy that which it had in the first.

So early as the year 1744, M. d'Alembert had applied this principle to the theory of the equilibrium, and the motion of fluids; and all the problems before solved by geometricians became in some measure its corollaries. The discovery of this new principle was followed by that of a new calculus, the first trials of which were published in a *Discourse on the General Theory of the Winds*, to which the prize-medal was adjudged by the academy of Berlin in the year 1746, and which was a new and brilliant addition to the fame of M. d'Alembert.

He availed himself of the favourable circumstance of the king of Prussia having just terminated a glorious campaign by an honourable peace, and in allusion to this, dedicated his work to that prince in the three following Latin verses:—

Hæc ego de ventis, dum ventorum ocyor alis
Palantes agit Austriacos Fredericus, et orbi,
Insignis lauro, ramum prætendit olivæ.

Swifter than wind, while of the winds I write,
The foes of conquering Frederick speed their flight;
While laurel o'er the hero's temple bends,
To the tir'd world the olive branch he sends.

This flattering dedication procured the philosopher a polite letter from Frederick, and a place among his literary friends.

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[1] The *Analyse Démontrée* of F. Beniau.

In the year 1747 D'Alembert applied his new calculus of Partial Differences to the problem of vibrating chords, the solution of which, as well as the theory of the oscillation of the air and the propagation of sound, had been given but incompletely by the geometricians who preceded him, and these were his masters or his rivals.

In the year 1749 he furnished a method of applying his principles to the motion of any body of a given figure; and he solved the problem of the precession of the equinoxes, determined its *quantity*, and explained the phenomenon of the nutation of the terrestrial axis, discovered by Dr Bradley.

In 1752 M. d'Alembert published a treatise on the *Resistance of Fluids*, to which he gave the modest title of an *Essay*, but which contains a multitude of original ideas and new observations. About the same time he published, in the Memoirs of the Academy of Berlin, *Researches concerning the Integral Calculus*, which is greatly indebted to him for the rapid progress it has made in the present century.

While the studies of M. d'Alembert were confined to geometry, he was little known or celebrated in his native country. His connections were limited to a small society of select friends: he had never seen any man in high office except Messrs d'Argenson. Satisfied with an income which furnished him with the necessaries of life, he did not aspire after opulence or honours, nor had they been hitherto bestowed upon him, as it is easier to confer them on those who solicit them, than to look out for men who deserve them. His cheerful conversation, his smart and lively sallies, a happy knack at telling a story, a singular mixture of malice of speech with goodness of heart, and of delicacy of wit with simplicity of manners, rendered him a pleasing and interesting companion; and his company, consequently, was much sought after in the fashionable circles. His reputation at length made its way to the throne, and rendered him the object of royal attention and beneficence. He received also a pension from government, which he owed to the friendship of Count d'Argenson.

The tranquillity of M. d'Alembert was abated when his fame grew more extensive, and when it was known beyond the circle of his friends, that a fine and enlightened taste for literature and philosophy accompanied his mathematical genius. Our author's eulogist ascribes to envy, detraction, and to other motives equally ungenerous, all the disapprobation, opposition, and censure that M. d'Alembert met with on account of the publication of the famous Encyclopedical Dictionary of Arts and Sciences, in conjunction with Diderot. None surely will refuse the well-deserved tribute of applause to the eminent displays of genius, judgment, and true literary taste, with which M. d'Alembert has enriched the great work now mentioned. Among others, the Preliminary Discourse which he has affixed to it, concerning the rise, progress, connections, and affinities of all the branches of human knowledge, is perhaps one of the first productions of which the philosophy of the present age can boast, and will be regarded as a striking specimen of just arrangement and sound criticism, and also as a model of accurate thinking and elegant writing.

Some time after this D'Alembert published his *Philosophical, Historical, and Philological Miscellanies.* These were followed by the *Memoirs of Christina, Queen of Sweden*, in which M. d'Alembert showed that he was acquainted with the natural rights of mankind, and was bold enough to assert them. His *Essay on the Intercourse of Men of Letters with Persons high in Rank and Office* wounded the former to the quick, as it exposed to the eyes of the public the ignominy of those servile chains which they feared to shake off or were proud to wear. A lady of the court hearing one day the author accused of having exaggerated the despotism of the great, and the submission they require, answered slyly, *If he had consulted me, I would have told him still more of the matter.*

M. d'Alembert gave very elegant specimens of his literary abilities in his translations of some select pieces of Tacitus. But these occupations did not divert him from his mathematical studies; for about the same time he enriched the *Encyclopédie* with a multitude of excellent articles in that line, and composed his *Researches on several important points of the System of the World*, in which he carried to a higher degree of perfection the solution of the problem of the perturbations of the planets, that had several years before been presented to the Academy.

In 1759 he published his *Elements of Philosophy;* a work extolled as remarkable for its precision and perspicuity; in which, however, are some tenets, relative both to metaphysics and moral science, that are far from being admissible.

The resentment that was kindled, and the disputes that followed it, by the article *Geneva*, inserted in the *Encyclopédie*, are well known. M. d'Alembert did not leave this field of controversy with flying colours. Voltaire was an auxiliary in the contest; but as, in point of candour and decency, he had no reputation to lose, and as he weakened the blow of his enemies by throwing both them and the spectators into fits of laughter, the issue of the war gave him little uneasiness. It fell more heavily on D'Alembert, and exposed him, even at home, to much contradiction and opposition.

It was on this occasion that the late king of Prussia offered him an honourable asylum at his court, and the place of president of his academy; and was not offended at his refusal of these distinctions, but cultivated an intimate friendship with him during the rest of his life. He had refused, some time before this, a proposal made by the empress of Russia to intrust him with the education of the grand duke; a proposal accompanied with all the flattering offers that could tempt a man ambitious of titles or desirous of making an ample fortune; but the objects of his ambition were tranquillity and study.

In the year 1765 he published his *Dissertation on the Destruction of the Jesuits.* This piece drew upon him a swarm of adversaries, who confirm the merit and credit of his work by their manner of attacking it.

Besides the works already mentioned, he published nine volumes of memoirs and treatises under the title of *Opuscules*, in which he has solved a multitude of problems relative to astronomy, mathematics, and natural philosophy; of which our panegyrist gives a particular account, more especially of those which exhibit new subjects, or new methods of investigation.

He published also *Elements of Music*, and rendered at length the system of Rameau intelligible; but he did not think the mathematical theory of the sonorous body sufficient to account for the rules of that art. He was always fond of music; which, on the one hand, is connected with the most subtile and learned researches of rational mechanics; while, on the other, its power over the senses and the soul exhibits to philosophers phenomena no less singular, and still more inexplicable.

In the year 1772 he was chosen secretary to the French academy. He formed, soon after this preferment, the design of writing the lives of all the deceased academicians from 1700 to 1772; and in the space of three years he executed this design, by composing 70 eulogies.

M. d'Alembert died on the 29th of October 1783. There were many amiable lines of candour, modesty, disinterestedness, and beneficence, in his moral character; which are described, with a diffusive detail, in his *éloge*, by M. Condorcet, *Hist. de l'Acad. Royale des Sciences*, 1783.

ALEMBIC, a chemical vessel, usually made of glass or copper, formerly used for distillation. The bottom part, which contained the subject for distillation, is called, from its shape, the *cucurbit;* the upper part, which receives and condenses the steam, is called the *head*, the beak of which is fitted into the neck of a receiver. Retorts, and the common *worm still*, are now more generally employed.

ALEMBROTH, in the writings of the alchemists, a word used for a sort of fixed alkaline salt, which had the power of the famous alkahest, in dissolving bodies, opening the pores of most or all known substances, and thence, as well as by destroying sulphurs, promoting the separation of metals from their ores. It is also used for a compound of corrosive mercury and sal ammoniac.

ALENCON, an arrondissement in the department of the Orne, in the north-west of France, comprehending an extent of 416 square miles, or 266,240 English acres. It is divided into six cantons, in which are 72,418 inhabitants. The capital bears the same name. It stands on the river Sarthe, and contains 13,230 inhabitants, who are employed in manufactures of iron, glass, leather, and some other goods. It is in long. 0. 10. E. lat. 48. 26. N.

ALENIO, JULIUS, a Jesuit, born at Brescia, in the republic of Venice. He travelled into the eastern countries, and arrived at Macao in 1610, where he taught mathematics. From thence he went to the empire of China, where he continued to propagate the Christian religion for 36 years. He was the first who planted the faith in the province of Xansi, and he built several churches in the province of Fokien. He died in August 1649, leaving behind him several works in the Chinese language.

ALENTEJO, one of the provinces into which the kingdom of Portugal is divided, deriving its name from its situation on the banks of the Tagus, in the Portuguese language Tejo. On the north it is bounded by the Portuguese Estremadura and Begra; on the east by Spanish Estremadura and Andalusia; on the south by Algarve; and on the west by the Atlantic Ocean, except in that part where the district of St Ubes, which is a port of Portuguese Estremadura, interposes betwixt it and the sea. Its extent is 883 square leagues, and in 1798 the number of its inhabitants was 380,480. It is the largest province in the kingdom. Its surface is very unequal: towards Spanish Estremadura the soil is moderately fruitful, but towards Algarve the country is covered with extensive forests of oak, cork, holm, and other trees, especially on the northern sides of the Sierras de Monchique and Caldeiraon. The climate is considered unhealthful, especially in the summer months, when the waters, which are abundant, become stagnant. The province produces abundance of cattle; it yields more wheat than it consumes, and in part supplies Lisbon with that necessary. It grows sufficient wine for its own consumption, but is deficient in oil, which is occasionally supplied from Spanish Estremadura and Andalusia. The natural boundary, on the side of Spain, is the river Guadiana; but the territory of Olivenza, extending over 110 square leagues, on the eastern side of that river, has, ever since the thirteenth century, been a part of Portugal; and the possession of it has been and still is an object of greater jealousy to the two nations, than its value to either will justify. The only rivers of this province which empty themselves into the ocean are the Tagus and the Odemira: the latter enters it near Villa Nova de Milfontes, and is navigable five leagues from its mouth to the town of its own name. The other streams run, some to the Guadiana, and the others to the Tagus. As this province presents a frontier to Spain, it is most abundantly provided with fortified places, which, if in a good state and well garrisoned, would become formidable auxiliaries in either offensive or defensive warfare; but in the late invasion by the armies of France, they were found to be of little practical benefit. This province is between 37. 20. and 39. 34. north latitude.

ALEPPO, or HALAB, a town of Syria, the capital of a pachalic, of which the limits are not exactly defined, is situated in the vast plain which extends from the Orontes to the Euphrates, and which towards the south terminates in the desert. It is built on eight hills or eminences, and is intersected by the Kowick, which in winter swells into a large stream, overflowing its bridges, and the neighbouring gardens which cover its banks. This river terminates 18 miles beyond Aleppo, in a morass which is haunted by wild boars and pelicans. The city itself is above 3½ miles in circumference, and is surrounded by an ancient strong stone-wall and ditch. Including the suburbs, the city is about 7 or 8 miles in compass. The wall is flanked by frequent towers; but the ditch is partly filled up with rubbish or occupied by kitchen-gardens, and the city being commanded by the adjacent heights, is entirely indefensible. The town has nine gates, all known by different names. On one of the hills on which the city is built, and on its north-east corner, is a castle seated on a mount. This mount is of a conic form, which seems in a great measure to be raised with the earth thrown up out of a deep broad ditch which surrounds it. The castle is entered from the south by a bridge of seven lofty narrow arches thrown over the ditch, on which are two gates fortified by turrets, and two more still higher on the hill. Aleppo is esteemed the fourth city of the Ottoman empire, only exceeded by Constantinople, Cairo, and Damascus. It appeared to Mr Buckingham, who visited it in 1816, to be one of the best built of all the cities in the East that he had seen. In the regularity of the streets, the aspect of the houses, and also in cleanliness, it was decidedly superior to the generality of Turkish towns. The houses are large and commodious, having terraces on their tops, on which the inhabitants sleep in summer, and generally sky-lights in form of a dome to let the light into the rooms, which, from their loftiness, the gilding on the window-shutters, cupboard doors, &c. have at first entrance a very grand and agreeable effect. They are all so equal in height, that there are seldom any steps to ascend or descend in going from one house to another; while several large vaulted streets increase the facility of communication, by affording a passage to every part of the city free from the embarrassment of the open streets. They are carefully paved, have two commodious footpaths, six inches high on each side, and the middle of the street is laid with brick, the small end upwards, for the convenience of the horses.

The mosques in Aleppo are numerous, and seven or eight of them are considered handsome, though none has more than a single minaret or steeple. They are built of freestone, with a dome in the middle, which is covered with lead. The members of the Greek, Arminian, Syrian, and Maronite communions have each a church; and the Europeans formerly had four small convents; but in 1807 there was only one, containing nine Italian monks. Before each of them is an area, with a fountain in the middle, designed for ablutions before prayers; and behind some of the larger there are little gardens. There are about twenty large khans or caravansaries, consisting of a capacious square, on all sides of which are rooms, built on the ground-floor, used occasionally for chambers, warehouses, or stables. Above stairs there is a colonnade or gallery on every side, in which are the doors of a number of small rooms, wherein the merchants, as well strangers as natives, transact most of their business. Numerous coffee-houses are seen in all parts, some large and handsome, with a fountain in the middle, and a gallery for musicians. They are greatly frequented, and by persons of the highest rank.

The bazars or market-places are long, covered, narrow streets, on each side of which is a great number of small shops, just sufficient to hold the tradesman and his goods, the buyer being obliged to stand without. Each separate branch of business has a particular bazar, which is locked up, as well as the streets, an hour and a half after sunset. This city is in itself one of the most agreeable in Syria, and is a trading and bustling place; and, owing to the great resort of Europeans, is considered by Mr Buckingham to be more than 100 years in advance of the other parts of Syria. On whatever side it is approached, its numerous minarets and domes present an agreeable prospect to the eye, fatigued with the continued sameness of the brown and parched plains. In the centre is an artificial mountain surrounded by a dry ditch, on which is a ruinous fortress. From hence we have a fine prospect of the whole city. To the north we discover the snowy mountains of Bailan, and on the west those which separate the Orontes from the sea, while to the south and east the eye can see as far as the Euphrates. In the time of Omar this castle stopped the progress of the Arabs for several months, and was at last taken by treachery; but at present it would not be able to resist the feeblest assault. Its slight wall, low and without a buttress, is in ruins; its little old towers are in no better condition; and it has not four cannons fit for service, not excepting a culverine nine feet long, taken from the Persians at the siege of Bassora. Three hundred and fifty janizaries, who should form the garrison, are busy in their shops. Within the walls of the castle is a well, which, by means of a subterraneous communication, derives its water from a spring a league and a quarter distant. In the environs of the city we find a number of large square stones, on the top of which is a turban of stone, which are so many tombs. Aleppo may be considered the emporium of Armenia and Diarbekir. Four caravans annually proceed through Natolia to Constantinople, and others arrive from Bagdad and Bassora with coffee from Mocha, and with muslins, shawls, and other goods from India. Caravans are sent also to Medina and Mecca, with which places a regular intercourse is maintained. The commerce with Europe is principally carried on from Scanderoon and Latakia, on the sea-coast. The chief commodities exported are, raw or spun cottons, clumsy linens fabricated in the villages, silk stuffs manufactured in the city, copper, *bourres* (coarse cloths) like those of Rouen, goats' hair brought from Natolia, the gall-nuts of the Kourdistan, the merchandise of India, and pistachio-nuts of the growth of the neighbourhood. The articles supplied by Europe are cloths, Lyonese stuffs, and bonnets after the fashion of Tunis from France; merceries, indigo, tea, sugar, paper, soap, &c.; and a great quantity of coral ornaments. The coffee of America, though prohibited, is introduced, and serves to mix with that of Mocha. British, French, Dutch, and Italian houses are established at Aleppo, for the purposes of trade; and most of the European states have consuls resident here. Aleppo is not exceeded in extent by any city in Turkey, except Constantinople and Cairo, and perhaps Smyrna. It is difficult to make any estimate of its population, but it is said to be increasing, and, according to the most authentic computation, does not probably contain less than 250,000 inhabitants. Of these, 30,000 are Christians, who enjoy the most perfect toleration, and are treated with more respect than in any town of the East.

The air of Aleppo is dry and piercing, but at the same time salubrious for all who are not troubled with asthmatic complaints. The city, however, and the environs, are subject to a singular endemial disorder, which is called the ringworm or pimple of Aleppo: it is in fact a pimple which is at first inflammatory, and at length becomes an ulcer of the size of the nail. The usual duration of this ulcer is one year: it commonly fixes on the face, and leaves a scar, which disfigures almost all the inhabitants. No reason is assigned for this malady; but M. Volney suspects it proceeds from the quality of the water, as it is likewise frequent in the neighbouring villages, in some parts of Diarbekir, and even in certain districts near Damascus, where the soil and the water have the same appearances. But the plague is a more destructive malady, a visitation of which is anticipated by the inhabitants every ten years. Its ravages are most fatal, owing to the blind fatalism of the Turks, who cannot be persuaded to take any precautions against the progress of this dreadful disease. In the plague which immediately preceded the year 1797, about 60,000 inhabitants were swept off. Of the Christian inhabitants the greater number are Greeks, next to them the Armenians, then the Syrians, and lastly the Maronites; each of whom has a church in the city called *Judida*; in which quarter, and the parts adjacent, most of them reside. The common language is the vulgar Arabic, but the Turks of condition use the Turkish. Most of the Armenians can speak the Armenian, some few Syrians understand Syriac, and many of the Jews Hebrew; but scarcely one of the Greeks understands a word of Greek. The people in general are of a middle stature, and tolerably well proportioned; but they seem neither vigorous nor active. Both sexes are handsome when young; but the women, as they come early to maturity, also fade very soon. The people of rank here are polite and affable, making allowances for that superiority which the Mahometan religion instructs its votaries to assume over all who hold a different faith. All the inhabitants of both sexes smoke tobacco to great excess; even the very servants have almost constantly a pipe in their mouth. Coaches or carriages are not used here; therefore persons of quality ride on horseback in the city, with a number of servants walking before them, according to their rank. Ladies of the first distinction are even compelled to walk on foot in the city, or to any place at a moderate distance: in longer journeys they are carried by mules, in a kind of couch close covered up. There is a number of public baths in this city, which are used by people of all ranks, except those of the highest distinction, who commonly have baths and every other convenience in their own houses. The bath, being the only public rendezvous of the female sex, is a great scene of amusement as well as of display: the bathers continue for hours conversing together, in their best apparel and most splendid ornaments. The gaiety of the place is still further enlivened by refreshments and music. Aleppo is of great antiquity, and is supposed to occupy the site of the ancient Beræa. It was overwhelmed by the flood of Saracen invasion in 638, when it was taken from the emperor Heraclius. In 1260 it was taken possession of and wasted by the Tartars, and in 1401 by Tamerlane, who defeated the Syrians, when it was given up to pillage. The adjacent country is fertile, and yields grain of all sorts, with which the city is plentifully supplied. All the fruits of Europe, as well as those of the East, are cultivated in gardens. The pistachio-nut is regularly cultivated. Aleppo is 70 miles east of Scanderoon, on the sea-coast, and 234 north-east of Damascus. Long. 37. 4. E. Lat. 36. 12. N.

Aleppo, The Puchalic of, one of the five governments into which Syria is divided. It comprehends the country extending from the Euphrates to the Mediterranean, between two lines, one drawn from Scanderoon to Beer, along the mountains; the other from Beles to the sea, by Mara and the bridge of Shoger. This space principally consists of two plains, that of Antioch to the west, and that of Aleppo to the east: the north and the sea-coast are occupied by considerably high mountains, known to the ancients by the names of Amanus and of Rhosus. In general, the soil of this government is fat and loamy. The lofty and vigorous plants which shoot up everywhere after the winter rains, prove its fertility, but its actual fruitfulness is but little. The greater part of the lands lies waste; scarcely can we trace any marks of cultivation in the environs of the towns and villages. Its principal produce consists in wheat, barley, and cotton, which are found especially in the flat country. In the mountains they rather choose to cultivate the vine, mulberry, olive, and fig trees. The sides of the hills towards the sea-coast are appropriated to tobacco, and the territory of Aleppo to pistachios. The pasturage is not to be reckoned, because that is abandoned to the wandering hordes of the Turcomans and Curds. The condition of the people depends entirely on the character of the pacha, who, when he is a tyrant, oppresses and plunders them without any restraint. From the mild administration of some of the late pachas, the people appear to be prosperous and happy. Mr Buckingham mentions, that the pacha who ruled in Aleppo at the time he visited this city acknowledged the influence of public opinion, and generally consulted the happiness of his subjects in the measures which he pursued.

ALES, Alexander, a celebrated divine of the confession of Augsburg, was born at Edinburgh the 23d of April 1500. He soon made considerable progress in school divinity, and entered the lists very early against Luther, this being then the great controversy in fashion, and the grand field wherein all authors, young and old, used to display their abilities. Soon after, he had a share in the dispute which Patrick Hamilton maintained against the ecclesiastics, in favour of the new faith he had imbibed at Marburg. He endeavoured to bring him back to the Catholic religion; but this he could not effect, and even began himself to doubt about his own religion, being much affected by the discourse of this gentleman, and still more by the constancy he showed at the stake, where David Beaton, archbishop of St Andrews, caused him to be burnt. Beginning thus to waver, he was himself persecuted with so much violence, that he was obliged to retire into Germany, where he became at length a perfect convert to the Protestant religion. The change of religion which happened in England after the marriage of Henry VIII. with Anne Bullen, induced Ales to go to London in 1535. He was highly esteemed by Cranmer archbishop of Canterbury, Latimer, and Thomas Cromwell, who were at that time in high favour with the king. Upon the fall of these favourites he was obliged to return to Germany, where the elector of Brandenburg appointed him professor of divinity at Frankfort on the Oder in 1540. But leaving this place upon some disgust, he returned to Leipsic, where he was chosen professor of divinity, and died in March 1565. He wrote a commentary on St John, on the Epistles to Timothy, on the Psalms, &c.

ALESHAM, a small, neat town in Norfolk. It is 15 miles north of Norwich, and 121 north-east by north of London. Long. 0. 30. E. Lat. 52. 53. N.

ALESSANDRIA, a city of Italy, in the Sardinian dominions, situated on the east bank of the Tanaro, capital of the province of the same name. It is the see of a bishop, and, besides the cathedral, contains 12 churches, 2 collegiate churches, with 17 monasteries and nunneries. It has many fine public and private buildings. It is strongly fortified, and in the several successive hostilities in Italy has been attacked and defended with great fury. In the year 1816 it contained 30,312 inhabitants. Two great fairs are held here, when the city becomes a mart resorted to by merchants from all parts of Italy. It is in long. 8. 40. E. lat. 44. 57. N.

Alessandria, a province of the duchy of Piedmont, in the dominions of the king of Sardinia, bounded on the north by Casale, on the east by Mortara, Boghera, and Tortona, on the south-east by Genoa, on the south-west by Aqui, and on the west by Asti. The extent is 314 square miles, or 200,960 acres. It comprehends two cities, 29 towns and villages, and 12 hamlets. The country is a plain, with few elevations, and very fruitful; but suffers from a deficiency of water, though the Po and the Tanaro, with some other rivers, pass through it. The chief productions are wheat, maize, wine, and silk; but besides these, wood, madder, hemp, flax, and fruit, are raised in abundance. The population is very dense, amounting to 70,728 persons, mostly employed in agriculture, which is conducted on the system of garden cultivation.

ALET, a town of France, in the department of the Aude and district of Limoux, at the foot of the Pyrenees. It is remarkable for its baths, and for the grains of gold and silver found in the stream which runs from the Pyrenean mountains, at the foot of which it stands. It is seated on the river Aude, 15 miles south of Carcassone, and 37 north-west of Narbonne. Long. 2. 5. E. Lat. 42. 59. N.

ALEUROMANCY, the same with what was otherwise called *alphitomantia*, and *crithomantia*, and means an ancient kind of divination performed by means of meal or flour.

ALEUTIAN, Aleutic, or Aleutsky Islands, so called from the Russian word *aleut*, signifying a bold rock, is the name given by the Russian discoverers to a chain of small islands situated in the Northern Pacific Ocean, and extending in an easterly direction from the peninsula of Kamtschatka, in Asiatic Russia, to the promontory of Alaska, in North America. According to the practice of the most recent Russian geographers, we have comprehended the whole of this archipelago under one general name, although it has been sometimes divided into three several groups; those nearest to the eastern coast of Kamtschatcha being properly called Aleutian, the central group the Andreanofskie or Andrenovian, and those nearest to the American promontory the Fox Islands. The Russian geographers usually separate Behring's and Copper Island which are at the western extremity of this chain, from the other parts of it, included by them under the general name of Aleutian Islands;[1] but as there seems no good reason for this exception, it certainly would be better to comprehend the whole under one general denomination

Progress of discovery.

The first voyage of discovery in this remote and dangerous archipelago was projected by Peter the Great, whose enterprising mind appears to have been strongly excited by the question, then much agitated, relative to the distance between the Asiatic and American continents; the solution of which seemed to be facilitated by the recent conquest of Kamtschatka. A short time previous to the death of that monarch, which took place in 1725, he drew up instructions, with his own hand, for the conduct of an expedition, which was to be intrusted to the command of an officer named Behring, who had already made several voyages in the sea of Kamtschatka by order of the crown. In 1728 Behring set sail from the mouth of the Kamtschatka River, and coasted the eastern shores of Siberia, as far to the northward as lat. 67. 18., but made no discovery of the opposite continent. In 1729 he again set sail, for the purpose of prosecuting the same enterprise, but with no better success. A third voyage was undertaken by order of the empress Anna in 1741, and Behring was again selected as chief of the expedition, another vessel being intrusted to the command of Tschirikoff. This enterprise proved more fortunate, and led the way to all the subsequent important discoveries of the Russians in those seas; although the immediate results of the voyage, upon the whole, were not deemed commensurate with the time and expense employed in fitting out the expedition. The principal object of the undertaking, however, appears to have been accomplished. Tschirikoff discovered the coast of America in the 56th degree of latitude; and Behring, who was separated from his companion in a storm, saw it in lat. 58. 28. On his voyage back to Kamtschatka, Behring's ship was driven on the island which now bears his name, where he soon afterwards died.

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[1] Mr Pinkerton appears to be mistaken when he says, that "the nearest Aleutian Isles of the Russians are those which we term Behring's and Copper." (*Geog.* 3d edit. vol. ii. p. 423.) We do not find that the term *Aleutian* has ever been applied to the two islands above mentioned. That name was first given by the early Russian discoverers to the small group of islands situated to the south-east of Behring's Island; and the islands composing this group were sometimes called the *nearest* Aleutian Isles, to distinguish them from the more easterly and remote parts of the chain. (See Coxe's *Russian Discoveries*, chap. ii.)

The two uninhabited islands, Behring's and Copper Island, now became known to the natives of Kamtschatka, who frequently resorted thither for the purpose of hunting sea-otters, and other animals affording valuable furs, with which they carried on a lucrative traffic. Some of the vessels which sailed upon these expeditions were driven by stormy weather to the south-east, by which means the group of Aleutian Islands came to be discovered. These islands seem to have been first visited in the year 1745, and continued to be resorted to for some time by private individuals, without attracting the attention of the Russian government. In the above-mentioned year a vessel called the Eudokia was fitted out at the expense of some private adventurers, and the command given to Michael Nevodtsikof, a native of Tobolsk. Having discovered three unknown islands, they ventured upon one of them, in order to kill sea-otters, of which they found a large quantity. These islands were undoubtedly the nearest Aleutian Islands, and were found well inhabited. The Russians continued upon this island until the 14th September 1746, when, having incurred the enmity of the natives by their arbitrary and hostile proceedings, they put to sea with the view of looking out for some uninhabited islands. Being overtaken, however, by a violent storm, they were driven about until the 30th October, when their vessel was wrecked upon the rocky shore of the island of Karaga, the inhabitants of which were of the Koriac tribe, and tributary to the Russian empire.

From this period the zeal or avarice of individual adventurers prompted them to undertake repeated voyages to the new-discovered islands, in some of which they penetrated as far eastward as the Fox Islands, where they collected a quantity of valuable skins; but, in consequence of their own rapacity and misconduct, they were frequently embroiled in fatal quarrels with the natives. One of the most remarkable of these voyages was that of the St Andrean and Natalia, fitted out by the merchant Andrean Tolstyk, which sailed from the mouth of the Kamtschatka River on the 27th September 1760, and on the 29th reached Behring's Island. Having been driven on shore by a violent autumnal storm, they were here obliged to pass the winter; and after refitting, they put to sea again on the 24th June 1761. They passed by Copper Island, which lies about 150 versts from the former, and steered south-east towards the Aleutian Isles, which they did not reach before the 6th August. From thence they proceeded on the 19th in quest of some more distant islands, for the purpose of exacting tribute, steering their course north-east and north-east by east, and were driven by a gale of wind towards an island, where, on the 30th August, they anchored in a safe bay. This island they called Ayagh or Kayaka, and another, which lay at the distance of about 20 versts, Kanaga. The Russians persuaded the inhabitants of these islands to become tributary to the empress, to which they made no great objection. Four other islands were discovered in the neighbourhood, and the crew remained here in great tranquillity until the year 1764, but met with no great success in their hunting excursions. This group of islands, which lies somewhat to the north-west of the Fox Islands, was denominated, in honour of the vessel which made the discovery, the Andreanofskie or Andrenovian Isles.

From the year 1758 to 1760 several vessels visited the Fox Islands, and obtained considerable cargoes of sea-otter and fox skins. But the crews appear to have behaved with the most shameful inhumanity towards the natives; and little information was derived from these voyages, except a few particulars which transpired during the course of a judicial investigation into their conduct. In 1762 four vessels sailed for the Fox Islands, of which only one returned safe to Kamtschatka. The first was the Zacharias and Elizabeth, fitted out by Kulkof and Company of Vologda, under the command of Drusinin, with a crew of thirty-four Russians and three Kamtschadals. This vessel touched at the Aleutian Islands, and in the beginning of September 1763 arrived at Umnak, one of the most considerable of the Fox Islands. On the 22d September they proceeded to Unalashka, where the vessel was brought into a safe harbour. Here the crew formed themselves into hunting parties, but were soon afterwards attacked separately by the natives, and cut off, with the exception of four individuals, who, after defending themselves with astonishing courage and intrepidity, and suffering incredible hardships, succeeded in making their escape from the island in a *baidar*, their own vessel having been destroyed by the savages. One of these four died during the home voyage; but the other three returned safe to Kamtschatka, and gave an account of their adventures.

The second vessel which sailed from Kamtschatka in 1762 was the Trinity, fitted out by the trading company of Nikiphor Trapesnikof, a merchant of Irkutsk, under the command of Ivan Korovin, and manned with thirty-eight Russians and six Kamtschadals. In the month of October they cast anchor before the south side of Behring's Island, where they resolved to winter, on account of the late season of the year. On the first of August 1763 Korovin sailed from Behring's Island, in company with Dennis Medvedef, who commanded a vessel[1] fitted out by Jacob

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[1] This was the fourth vessel which sailed in 1762; but, as the whole crew were massacred by the natives, we have no distinct account of the voyage.

Protassof, merchant of Tiumen. On the 15th the former vessel made Unalashka, and Medvedef reached Umnak. After having reconnoitred the coast, and received hostages from the *Toigons* or Chiefs, Korovin sent out several hunting parties; but the natives soon began to exhibit hostile intentions, and three Kamtschadals belonging to Kulkof's ship arrived with accounts of the destruction of that vessel, and the massacre of the crew. On the 10th December the savages assembled in large bodies, and invested the hut which the Russians had constructed, and continually annoyed them with their darts. Korovin finding himself thus harassed by the natives, ordered the hut to be destroyed, and retired to his vessel, which was removed to the distance of a hundred yards from the beach, where they lay at anchor from the 5th March to the 26th April 1764. Here the natives attempted to surprise the vessel; but Korovin, having been warned of their approach, compelled them to retreat. On the 26th April Korovin sailed from Unalashka, and, after being driven about by contrary winds, the vessel was at length stranded on the 28th, in a bay of the island of Umnak. Having got on shore, the crew attempted to secure themselves between their *baidar* and some empty barrels, with the sails spread over them in the form of a tent. Next morning before the break of day they were surprised by a large body of the natives, who attacked them with their darts, and wounded every one of the crew. Korovin, however, sallied out, in company with four Russians, and put the savages to flight, although he and his party were so severely wounded, that they had scarcely sufficient strength to return to the tent. During the night the vessel was dashed to pieces by the storm. On the 30th of April they were again attacked by the natives, who, however, were soon put to flight by the fire of the Russians. On the 21st of July, Korovin, with the remainder of his crew, which was now reduced to the number of twelve persons, including six Kamtschadals, put to sea in a *baidar*; and, having landed upon another part of the same island, they discovered the remains of a vessel which had been burnt, and at a small distance, a deserted Russian dwelling, containing twenty dead bodies in their clothes; among which they recognised several of those individuals who had sailed in Protassof's vessel, and distinguished, among the rest, the commander Medvedef. Korovin afterwards joined Glottof's vessel (of whose proceedings we shall immediately give some account), which he quitted in the month of April 1765, and went over, with five other Russians, to Soloviof, with whom he returned the following year to Kamtschatka.

The third voyage from Kamtschatka in 1762, and the most fortunate and most remarkable of the whole, was that of the Andrean and Natalia, which was fitted out by Terenty Tsebaeffskoi and Company, under the command of Stephen Glottof, an experienced and skilful seaman of Yarensk. This vessel sailed on the 1st October, with a crew of thirty-eight Russians and eight Kamtschadals. Having wintered at Copper Island, they set sail from thence on the 26th July 1763, and steered for the Fox Islands. In consequence of storms and contrary winds, they were thirty days on the voyage to Umnak, where they arrived on the 24th August, and without dropping anchor, sailed farther in quest of new islands, of which they passed eight contiguous to each other, and separated by straits from 20 to 100 versts broad. Glottof, however, did not land until he reached the most eastward of these islands, called by the inhabitants Kadyak. Here and in the neighbouring islands they passed the winter, and collected a considerable quantity of furs; but as the conduct of the natives, at first decidedly hostile, was always suspicious, Glottof did not think it prudent to prolong his stay; and accordingly, having taken on board all the peltry and stores, he left Kadyak on the 24th May 1764, and sailed for Umnak, where he arrived on the 3d July. He remained here two years, sending out hunting parties through the islands of Umnak and Unalashka, and commenced his voyage homewards in the month of July 1766. In the month of August he arrived safe in Kamtschatka River with a rich cargo.

Soloviof, to whose voyage we have already alluded, sailed from Kamtschatka on the 25th of August 1764, in a ship called the Holy Apostles Peter and Paul, fitted out by Jacob Ulednikof and Company, merchants of Irkutsk. This vessel reached Unalashka on the 17th September, where Soloviof passed two winters; and having succeeded, notwithstanding the continual hostility of the natives, in collecting a considerable cargo of peltry, he returned to Kamtschatka in the month of July 1766.

Having thus traced an outline of the gradual progress of early discovery in this archipelago, it seems unnecessary to proceed with an enumeration of the subsequent voyages performed by private individuals. These were undertaken merely for commercial purposes: the accounts brought home by the adventurers were generally imperfect and incorrect, and rather tended to excite than to gratify the curiosity of those who might be desirous of obtaining more accurate and more ample information. We shall therefore now turn to the conduct of those expeditions which were fitted out by the state for the express purpose of discovery.

In the year 1768 Captain Krenitzin and Lieutenant Levashef sailed from the mouth of the Kamtschatka River by order of the empress Catharine, to examine the chain of Aleutian Islands. This commission they accordingly executed very carefully, having surveyed the whole of this archipelago, from Behring's Island to the promontory of Alaska; and, after spending the winter among the Fox Islands, they returned to Kamtschatka in the autumn of 1769.

But our great navigator Captain Cook communicated more accurate scientific information respecting these islands, as well as the coasts of the two continents, than all the previous voyages of the Russian discoverers had afforded. During his third and last voyage, in the year 1778, he surveyed the eastern portion of this archipelago, accurately determined the positions of some of the most remarkable islands, and corrected many errors of former navigators.

In the year 1785 a fresh expedition was set on foot by the Russian government, the command of which was intrusted to Captain Billings, an English naval officer in the Russian service, who had accompanied Captain Cook in his last celebrated voyage to the Pacific Ocean. This expedition appears to have been suggested by Mr Coxe, who was at that time at St Petersburg, and whose *Account of the Russian Discoveries between Asia and America* had already attracted the attention of the Russian government. During this voyage, which was not completed until the year 1796, Captains Billings and Sarytschef explored the whole chain of the Aleutian Islands, particularly that part of it which had been visited by Captain Cook, and some parts of the adjacent western coast of America. Ample details of the conduct of this expedition have been published in the narratives of Martin Sauer, who officiated as secretary to Captain Billings, and of Admiral Sarytschef.

Some years after the termination of the expedition under Captain Billings, the attention of the Russian American Company was turned towards the best means of supplying their settlements on the north-west coast of America with provisions and stores of all kinds; and it was resolved to try whether the conveyance by sea would not answer the purpose better than the long and tedious journey by land to Ochotsk. With the view of ascertaining the practicability of the project, Captain Krusenstern, an experienced Russian naval officer, who had served for a long period in the British navy, suggested the plan of an expedition from Cronstadt, round Cape Horn, to the Aleutian Islands and the north-west coast of America. This plan was approved of by Count Romanzof, the minister of commerce, and Admiral Mordwinof, minister of the marine, and obtained the sanction of his Imperial Majesty. Two vessels, called by the Russians the Nadeshda and the Neva, were accordingly purchased in London for the voyage. The command of the expedition was intrusted to Captain Krusenstern, the original author of the plan, and Captain Lisiansky was appointed to the Neva. These two vessels accordingly sailed in company from Cronstadt, in the month of August 1803, and, after a short stay at Falmouth, proceeded to the Brazils, from whence they sailed round Cape Horn to the Sandwich Islands. Here they separated, the Nadeshda being ordered on a distinct mission to Japan and China, while Captain Lisiansky, in the Neva, proceeded to Kadyak and the American settlements. Of this voyage very full and interesting accounts have been lately published by Captains Krusenstern and Lisiansky, and by Dr Langsdorff, who accompanied the expedition in the quality of physician.

Enumeration and description of the Aleutian Islands.

From the ample sources of information to which we have alluded in the foregoing narrative, we shall now proceed to exhibit an enumeration and general description of the islands composing this singular chain, which appears to be a prolongation of either continent. We shall begin with the more westerly part of the chain, consisting of those islands which lie nearest to Kamtschatka, and proceed eastwards to the American promontory. The first is Commodore or Behring's Island, situate, according to Cook's reckoning, in 55° of latitude and 6° of longitude from the harbour of Petropaulowska in the bay of Awatska. It is from 70 to 80 versts long, and stretches from north-west to south-east. Ten leagues from the south-east point of this island, in the direction of east by south, or east-south-east, lies Mednoi Ostroff, or Copper Island, so called from large masses of native copper being found upon the beach. To the south-east of Copper Island lie three small islands, Attak or Attoo, Semitshi, and Agattoo, called by the Russians *Plishnie Ostrova*, or the nearest Aleutian Islands. Of these Attak is the largest; it is nearly of the same shape as Behring's Island, but rather more extensive, stretching from west to east to the length of 18 leagues. These islands are situated between 54° and 55° of north latitude. Attak has two harbours, one of which lies on the southern coast. From the eastern extremity of the Aleutian Islands properly so called, another group runs south-eastward, continuing the chain as far as the western extremity of the Fox Islands. These are called the Andreanofskie Islands; but we have less accurate information respecting this central part of the chain than regarding the eastern and western groups. They are said to lie within the 52d and 54th degrees of north latitude, to be of inconsiderable extent or importance, and therefore seldom visited by recent navigators. The most remarkable are, Takavangha, which has in its centre, near the northern coast, a burning mountain; Kanaghi or Kanaga, likewise with a high smoking mountain; Ayag, which has a number of good bays and anchoring-places; and Tshetchina, on which a high white mountain overtops the rest, which apparently is an extinct volcano, as there are still hot springs on this island. Atshak or Atchka, and Amlac, are also usually reckoned among the number of the Andrenovian Isles. The former greatly resembles Copper Island, and is provided with a commodious harbour.

By far the most important and best explored portion of this archipelago is the most easterly group, called by the Russians *Lyssie Ostrova*, or the Fox Islands. Of these islands the most considerable are, Umnak, Unalashka or Oonalashka, and Unimak, the last of which is separated by a narrow strait from the promontory of Alaska. Beyond these, to the north-east, lies the large island of Kadyak or Kodiak, which is generally included among the group called Schumagin's Islands.

The whole of the islands composing this chain are bare and mountainous; their coasts are rocky and surrounded by breakers, which renders the navigation of those seas exceedingly dangerous. The land rises immediately from the coasts to steep bald mountains, gradually ascending higher behind each other, and assuming the appearance of chains of mountains, with a direction lengthwise of the island. Springs take their rise at the bottom of the mountains, and either flow in broad and rapid streams into the neighbouring sea, or, collecting in the rocky vales and glens, form ample lakes, which send off their superfluous waters by natural canals into the adjacent bays. These islands bear evident marks of volcanic formation, and several of them have still active volcanoes, which continually emit smoke, and sometimes flames. No traces of metals have been discovered on these islands, but carneoles and sardonyxes are brought from thence. Their soil is said to be similar to that of Kamtschatka, and affords the same kinds of edible wild berries and roots, excepting some few vegetables which seem to be of foreign origin. No wood of any considerable growth has been perceived upon any of these islands, except a very small quantity on Unalashka. The land animals are bears, wolves, river-otters, river-beavers, and ermines. The sea-otter, so valuable on account of its skin, is frequently caught; but the number of these animals, it is believed, is much diminished of late. On the Fox Islands they have a great variety of foxes, black, grey, red, and brown. The sea abounds with all sorts of seals, dolphins, and whales; sea-lions and porpoises are rare, and sea-cows not at all to be seen. Salmon are caught in great abundance and variety, and halibut of an immense size are frequently taken. The winter upon these islands is tolerably mild, but the summer is equally short and unpleasant. The inhabitants are pretty numerous, and tributary to Russia, from whence vessels are sent out, and establishments formed upon these islands, on account of the very profitable chace of sea-otters and foxes.

Island of Unalashka.

Unalashka, one of the largest of the Fox Islands, was visited by Captain Cook during his last voyage, and seems to merit particular notice. This island stretches from north-east to south-west, and is from 70 to 80 versts in length, but of very unequal breadth. On the north and north-east sides there are many bays and creeks, in some of which are very secure harbours for vessels. A part of the south-west shore consists of very high, steep, inaccessible cliffs, and another part has remained hitherto wholly unexplored. The whole island consists of a mass of rocks, covered only with a very thin coat of earth; the hills are of very unequal height, and are intersected by irregular valleys, the soil of which is commonly argillaceous, or an earth which appears washed down from the hills. In the lower valleys there is great abundance of grass, which would furnish very good food for cattle;

Character of the natives.

indeed, Captain Cook was of opinion that cattle might subsist at Unalashka all the year round, without being housed; and the soil, in many places, appeared capable of producing grain, roots, and vegetables. But the Russian traders and the natives seem satisfied with what nature brings forth. No wood grows on this and the neighbouring islands; only low bushes, and shrubs of dwarf birch, willow, and alder. For all the timber used for the purposes of building, &c. they are indebted to the sea, which wafts it to their shores from the adjacent continent of America. The inhabitants are rather low in stature, but plump and well-shaped, with short necks, swarthy chubby faces, black eyes, small beards, and long, straight, black hair, which the men wear loose behind and cut before, but the women tie up in a bunch. With regard to their character, Captain Cook describes them as, to all appearance, the most inoffensive people he ever met with, and perfect patterns of honesty. But according to the accounts of the first discoverers, this does not seem to have been their original disposition; and recent travellers have observed, that although generally kind-hearted and peaceable, yet, when roused to anger, they become exceedingly malevolent, and indifferent to all danger, even to death itself. The clothing of the men and women is nearly the same, and consists of a sort of frock or shirt, called *parka*, fastened round the neck with a broad stiff collar, and descending below the knee. These garments are made of the skins of seals, prepared in a manner peculiar to themselves, and sewed together very ingeniously. Though simple in their form, they are ornamented in a variety of ways,—with glass beads, beaks of sea-parrots, long white goats' hair brought from Siberia, or small red feathers. Over the frock the men sometimes wear a *kamleika* or rain-garment. This is made of gut, which is water-proof, and has a hood to it, which draws over the head, and is tied under the chin. When on shore, the men wear boots made of seal-skin; and they all have a kind of oval-snouted cap, made of wood, with a rim to admit the head. These caps are dyed with green and other colours, and are very fancifully ornamented with ivory figures, carved from the teeth of the sea-cow, with glass or amber beads, and with the bristles from the beard of the sea-lion. They make use of no paint: tatooing was formerly very much in use among them, particularly among the women; but their intercourse with the Russians has rather brought this practice into disrepute. Both men and women, particularly the latter, bore the under lip, and insert pieces of bone or other ornaments; but this practice has also decreased of late. The women, for the most part, go barefooted: they wear bracelets of glass beads just above the wrists and ankle-joints, and are very fond of rings upon their fingers. The principal food of these islanders consists of fish, sea-animals, birds, roots, and berries. They dry large quantities of fish in summer, which they lay up in small huts for winter use; and roots and berries are also preserved for the same time of scarcity. Among the fish, the most common and most abundant are several sorts of salmon, cod, herrings, and halibut. The last is the most esteemed, and is sometimes caught of an enormous size. The fat of the whale is also a favourite species of food; when it grows old and rancid, it serves to light and warm their houses. They eat almost every thing raw; but of late they have learnt some simple modes of cookery from the Russians. Vegetable food does not appear to be held in much esteem by the Unalashkans. The sweet plant, the Siberian parsnip (***Heracleum Sibericum***), is but little eaten, any more than the bulb of the *Saranna*, or Kamtschadale lily. Berries of an eatable quality abound, such as bramble-berries, cran-berries, hurtle-berries, heath-berries, and several others. Of late the Russians have begun to plant potatoes, which succeed extremely well, and are much liked by the people. The habitations of the Unalashkans are holes dug in the earth, covered with a wooden roof, over which they throw grass and earth; so that a village has the appearance of a European church-yard full of graves. The entrance into these huts is from the roof; some of the largest, however, which are inhabited by the Russians, have a low door in the side. The light is also admitted by the roof, through an opening or window covered over with seals' entrails, or dried fish-skin. Several divisions are made within, by means of seal-skins or straw-mats, which separate the apartments of the different families that occupy the habitation. Their household furniture consists of bowls, spoons, buckets, piggins or cans, matted baskets, and perhaps a Russian kettle or pot. The knife, and the hatchet, or rather a small flat piece of iron, made like an adze by fitting it into a crooked wooden handle, are the only iron tools found amongst them. Yet all their instruments and utensils are made with the greatest neatness and the most exact symmetry. The needles with which they sew their clothes and embroider are made of the wing-bone of the gull, with a very nice cut round the thicker end instead of an eye, to which they tie the thread so skilfully, that it follows the needle without any obstruction. Their thread is made of the sinews of the seal, the fibres of which they split to the thickness which each sort of work requires. All sewing is performed by the women: they are the tailors, shoemakers, and boat-builders or boat-coverers. At their leisure hours, particularly in long winter evenings, they make fine mats, little baskets, and pocket-books of straw, that are both beautiful and strong. Indeed, Captain Cook observes, there is a neatness and perfection in most of their work, that shows they neither want ingenuity nor perseverance. Their houses have no fire-place, but are heated as well as lighted by lamps. These are made of a flat stone, hollowed on one side like a plate: in the hollow part they put the oil, mixed with a little dry grass, which serves the purpose of a wick. They produce fire both by collision and by attrition; the former by striking two stones one against another, one of them being previously rubbed with brimstone. The latter method is with two pieces of wood; one of which is a pointed stick, and the other a flat piece. The pointed end of the stick they press upon the other, whirling it nimbly round as a drill; thus producing fire in a few minutes.

Occupations.

The principal occupations of the Aleutians are fishing and hunting, and preparing the implements necessary for both. Their *baidars, baidarkas*, or boats, resemble the canoes of other savages. They consist of a skeleton of wood, over which is stretched a leather covering made of seal-skins. The boats of the Unalashkans are much superior in point of beauty to those of any of the other islands: some of them appear so transparent that one might trace the formation of the inside, and the manner in which the rower sits. In their form they are long and narrow, and commonly hold only one person; sometimes they are made to hold two, and very rarely three; each person sitting in a round hole just fitted to the size of the body. The whole canoe is so extremely light, even when sodden with water, that it may be carried with ease in one hand. They are impelled by means of double paddles, seven or eight feet long, which are managed with great dexterity. Experienced navigators will sometimes venture out a considerable way to sea in these boats, even in very stormy weather. The darts, or javelins, with which they kill their game, are formed with the same neatness as their other instruments, and adapted with the greatest judgment to the different objects of the chase. For land animals, a single barbed point; for birds, three points of light bone, spread and barbed; for seals, &c. they use a false point, inserted in a socket at the end of the dart, which parts on the least effort of the animal to dive, remaining in its body. A string of considerable length is fastened to this barbed point, and twisted round the wooden part of the javelin. This serves as a float to direct them to the seal, which having the stick to drag after it, soon tires, and becomes an easy prey. These darts are not shot from a bow, but slung from a small plank, about 18 inches long and two inches broad. In order that the weapon may be held the faster, they have a sort of handle at the lower end, and an opening through which the fore-finger is thrust. At the other end is a small channel, into which the javelin fits, with a little knob which serves to retain it. When the javelin is to be thrown, the plank is held horizontally, and the aim being taken, the weapon is directed by the middle finger and thumb. This is done with so much dexterity, and the motion given to it is so powerful and so rapid, that the object aimed at is rarely missed; even whales are killed without any other weapon.

Amusements.

Their favourite amusement appears to be dancing, in which, however, they do not seem to exhibit any particular exertion of strength or expression of elegance, the only motion being a sort of hop, the performer scarcely moving from the place he first takes up. Their music is exceedingly rude, consisting of a small drum or tambour, and a rattle made of the bladder of a sea-dog, filled with peas or small pebbles. In their leisure hours they amuse themselves with making these little drums and rattles, which are frequently ornamented with a good deal of ingenuity and elegance; and with cutting out from the teeth of the sea-cow small figures of men, fish, sea-otters, and other objects, in a manner that appears very extraordinary, considering that the sea-cow's teeth are much harder than ivory, and that they have no proper tools to work with.

Religion.

The religion of these islanders, like that of most uncivilized nations, consists in superstitious observances and a belief in charms. Many of them have been baptized, and are nominally professors of the Greek faith; of which, however, they understand nothing more than making the sign of the cross.

Marriages.

They have no marriage ceremony: every man may have as many wives as he can conveniently maintain: if his means decrease, he sends first one, then another, back to their parents; and these women become perfectly at liberty to look out for other husbands. Sometimes the same woman lives with two husbands; and it is not uncommon for men to sell or exchange wives. Boys, if they happen to be very handsome, are often brought up entirely in the manner of girls, instructed in the arts of female blandishment, and used as concubines. This shocking, unnatural, and immoral practice has prevailed here even from the remotest times. Such men are known under the name of *schopans*.

Burials.

The bodies of the dead, especially of the men, were formerly interred in places set apart for the purpose, and with particular ceremonies. Their best javelins and clothes, with a portion of train-oil and other articles of food, were laid with them in the grave; and sometimes even slaves of both sexes were slaughtered upon the occasion. These customs are now, however, entirely laid aside.

Population and government.

The population of Unalashka and the neighbouring islands appears to have been considerable, amounting to several thousands. In 1790 Sarytcheff reckoned it at 1300. According to the most recent accounts, it does not appear to amount to more than 300. This rapid depopulation is ascribed partly to the practice of sending the best hunters from hence to a distance, to chace the large sea-otters, few of whom ever return to their families; and partly to the state of oppression under which the natives live, and the change which has taken place in their modes of living. Captain Cook seems to consider the natives of these islands as originally of the same extraction with the Greenlanders and Esquimaux. When first discovered by the Russians they were under the government of *Toigons*, or chiefs, who, however, possessed little superior distinction or dignity, and had no revenue. At present they are all subject to the government of the Russian settlers.

Russian settlements and commerce.

Throughout the whole of the Aleutian Islands, on the island of Kadyak, and the western coast of America, the Russians have formed settlements, for the purpose of hunting and collecting furs, with which they carry on a lucrative commerce, particularly with the Chinese. The most valuable fur is that of the sea-otter; an animal which has now become rare on these islands, in consequence of the extreme eagerness with which they have been hunted and killed. Besides the sea-otter, there are numbers of foxes, especially on the Fox Islands. The black foxes found on these islands are not so valuable as those of Siberia. The Arctic or ice fox, called also the rock fox, and the blue fox, from the natural colour of the fur, which is of a bluish grey, is very common. From the first discovery of these islands by Behring and Tscherikoff, in 1741, the fur-trade was carried on for a long period entirely by private adventurers, and appears to have been productive of great abuses. The natives were frequently treated in the most cruel and barbarous manner; and the keenness displayed by these rapacious hunters threatened to extirpate the race of animals upon which the trade depended. Convinced of the extreme necessity of putting a stop to this destructive plan of proceeding, Schelikoff, an intelligent Russian merchant, took considerable pains to unite the different partakers of this trade into a company, in order that it might be conducted with prudence and precaution, upon some plan that might prove advantageous to all parties. In 1785 he succeeded in joining company with the Golikoffs. They increased their capital, and fitted out several ships, which the enterprising Schelikoff commanded in person. Factories, protected by forts, were established in almost all the Aleutian Islands, as far eastward as Kadyak; and during several years they continued this lucrative trade in conjunction, by which they acquired considerable wealth.

Establishment of the Russian American Company.

The success of this connection induced several merchants to unite like Schelikoff and the Golikoffs; and in this manner was laid the foundation of the present *Russian American Company*. The irregular manner, however, in which the trade was still carried on, and the cruelty which was frequently exercised by the Russian merchants towards the natives of the islands, drew upon them great and well-founded censure; insomuch that the emperor Paul determined to put an end to the company and the trade at the same time. This determination would have infallibly been carried into effect, but for the interference of M. von Resanoff, who had married Schelikoff's daughter, and was personally interested in the successful continuance of the American Company. In consequence of his active interposition, the new-established company was formally confirmed in 1799, with considerable privileges.

See Müller's *Samlung Russischer Geschichte*, particularly the third volume. *Neue Nachrichten von denen neuentdeckten Insuln in der See zwischen Asia und America, &c. verfasset von J. L. S.*—Hamburg and Leipsic, 1776. Coxe's *Account of the Russian Discoveries*. Tooke's *View* *of the Russian Empire*. The *Voyages* and *Travels* of Billings; Sarytcheff; Cooke; Meares; Dixon; Vancouver; La Perouse; Mackenzie; Krusenstern; Lisiansky; and Dr Langsdorff. (K.)

ALEXANDER THE GREAT, king of Macedonia. His father Philip laid the plan of that extensive empire which his son afterwards completed. Philip, having made himself master of Greece, began to cast his eyes upon Persia, with a view to retaliate upon that haughty empire the injuries of former times. It was the popular topic of the day. But this prince was cut off in the midst of his enterprise. Such, however, was the influence of Alexander in the assembly of the Grecian states, that he was created general of their combined forces, in the room of his father. Having made every needful preparation, at the head of a veteran army he invaded Asia. The lieutenants of Darius, who was then king of Persia, opposed him at the river Granicus, where Alexander obtained a complete victory, after which he pursued his march through Asia. At Issus, near Scanderoon, he was met by Darius in person, at the head of a prodigious army. Here he obtained a second victory, and took the camp of Darius, together with his family, whom he treated with the utmost humanity. Contrary to all the maxims of war, instead of pursuing Darius, he made an excursion into Egypt, and, as far as appears, through no better motives than those of vanity. Here he was acknowledged to be the son of Jupiter Ammon. In the mean time Darius recruited his strength, and got together an army superior to what he brought into the plain of Issus. Alexander, having finished his Egyptian expedition, traversed Asia, and passed the Euphrates. At Arbela, a town in Assyria, he met Darius. Here a decisive battle was fought, which put all Persia into the hands of Alexander. His ambition not being satisfied with the conquest of that vast country, he projected an expedition into India. Here he met with great opposition from Porus, a gallant prince, whom in the end he reduced. Beyond the Ganges lay a country still unsubdued. He notified it to his army, that he proposed to pass the river. But these veterans, harassed with their fatigues, and seeing no end of their labour, mutinied, and refused to march further. The disappointed chief was therefore obliged to return. At Babylon he proposed to receive ambassadors, appoint governors, and settle his vast monarchy; but his excesses put an end to his life in the midst of his designs, and in the flower of his age.

The character of this hero is so familiar to every body, that it is almost needless labour to draw it. All the world knows, says Mr Bayle, that it was equally composed of very great virtues and very great vices. He had no mediocrity in any thing but his stature: in his other properties, whether good or bad, he was all extremes. His ambition rose even to madness. His father was not at all mistaken in supposing the bounds of Macedon too small for his son; for how could Macedon bound the ambition of a man who reckoned the whole world too small a dominion? He wept at hearing the philosopher Anaxarchus say that there was an infinite number of worlds: his tears were owing to his despair of conquering them all, since he had not yet been able to conquer one. Livy, in a short digression, has attempted to inquire into the events which might have happened if Alexander, after the conquest of Asia, had brought his arms into Italy. Doubtless, things might have taken a very different turn with him; and all the grand projects which succeeded so well against an effeminate Persian monarch might easily have miscarried if he had had to do with rough, hardy, Roman armies. And yet the vast aims of this mighty conqueror, if seen under another point of view, may appear to have been confined in a very narrow compass; since, as we are told, the utmost wish of that great heart, for which the whole earth was not big enough, was, after all, to be praised by the Athenians: for it is related, that the difficulties which he encountered in order to pass the Hydaspes, forced him to cry out, "O Athenians, could you believe to what dangers I expose myself for the sake of being celebrated by you?" But Bayle affirms that this was quite consistent with the vast unbounded extent of his ambition, as he wanted to make all future time his own, and be an object of admiration to the latest posterity; yet did not expect this from the conquest of worlds, but from books. "He was perfectly in the right," says Bayle; "for if Greece had not furnished him with good writers, he would long ago have been as much forgotten as the kings who reigned in Macedon before Amphitryon."

His excesses with regard to wine were notorious, and he committed, when drunk, a thousand extravagancies. It was owing to wine that he killed Clitus, who saved his life, and burnt Persepolis, one of the most beautiful cities of the East: he did this last, indeed, at the instigation of the courtesan Thaïs; but this circumstance made it only the more heinous. It is generally believed that he died by drinking immoderately; and even Plutarch, who affects to contradict it, owns that he did nothing but drink the whole day he was taken ill. The reader who is desirous of further information in regard to Alexander and his historians, may consult M. de St Croix's *Critical Inquiry concerning his Life*, of which there is an English translation by Clayton.

ALEXANDER AB ALEXANDRO, a Neapolitan lawyer, of great learning, who flourished toward the end of the 15th and beginning of the 16th century. He followed the profession of the law, first at Naples, afterwards at Rome: but he devoted all the time he could spare to the study of polite literature; and at length he entirely left the bar, that he might lead a more easy and agreeable life with the Muses. The particulars of his life are to be gathered from his work entitled *Dies Geniales*. We are there informed that he lodged at Rome, in a house that was haunted; and he relates many surprising particulars about the ghost. He says also, that when he was very young, he went to the lectures of Philelphus, who explained at Rome the Tusculan Questions of Cicero. He was there also when Nicholas Perot and Domitius Calderinus read their lectures upon Martial. The particular time when he died is not known; but he was buried in the monastery of the Olivets. Tiraqueau wrote a learned commentary upon his work, which was printed at Lyons in 1587, and reprinted at Leyden in 1673, with the notes of Dennis Godfrey, Christopher Colerus, and Nicholas Mercerus.

ALEXANDER, *Noel*, an indefatigable writer of the 17th century, born at Rouen, in Normandy, 1639. After finishing his studies at Rouen, he entered into the order of Dominican friars, and was professed there in 1655. Soon after he went to Paris, to go through a course of philosophy and divinity in the great convent, where he distinguished himself so, that he was appointed to teach philosophy there, which he did for twelve years. M. Colbert showed him many marks of his esteem; and being determined to omit nothing to perfect the education of his son, afterwards archbishop of Rouen, he formed an assembly of the most learned persons, whose conferences upon ecclesiastical history might be of advantage to him. Father Alexander was invited to this assembly, where he exerted himself with so much genius and ability, that he gained the particular friendship of young Colbert, who showed him the utmost regard as long as he lived. These conferences gave rise to Alexander's design of writing an ecclesiastical history; for being desired to reduce what was material in these conferences to writing, he did it with so much accuracy, that the learned men who composed this assembly advised him to undertake a complete body of church history. This he executed with great assiduity, collecting and digesting the materials himself, and writing even the tables with his own hand. He at last completed his work in 1686. Towards the latter part of his life he was afflicted with the loss of his sight; a most inexpressible misfortune to one whose whole pleasure was in study, yet he bore it with great patience and resignation. He died merely of a decay of nature, 1724, in the 86th year of his age.

Alexander Severus, emperor of Rome, succeeded Heliogabalus about A. D. 222, when but 16 years of age. His mother's name was Mammæa, and by her advice he in a great measure regulated his conduct. He applied himself to the reformation of abuses, the state having been greatly disordered by the vicious conduct of his predecessor. He was a most strict lover of justice, an encourager of learning and learned men, and favourable to the Christians. He made a successful expedition against the Persians; but endeavouring to reform his troops, who had grown very licentious under the late bad government, they murdered him at the instigation of Maximinus, in the 29th year of his age, together with his mother, A. D. 235.

Alexander VI. *Pope*, had four bastards when he was cardinal, for one of whom he had so great affection, that he stuck at nothing to raise him. Designing to poison some cardinals, he was poisoned himself, A. D. 1503. See Borgia.

Alexander VII. *Pope*. See Chigi.

Alexander, bishop of Lincoln in the reigns of Henry I. and Stephen, was a Norman by birth, and nephew of the famous Roger, bishop of Salisbury, who first made him archdeacon of Salisbury, and afterwards, by his interest with the king, raised him to the mitre. Alexander was consecrated at Canterbury, July 22. 1123. Having received his education under his uncle the bishop of Salisbury, and been accustomed to a splendid way of living, he affected show and state, more than was suitable to his character or consistent with his fortune. This failing excepted, he was a man worthy of honour, and every way qualified for his station. The year after his consecration, his cathedral church at Lincoln having been accidentally burnt down, he rebuilt it, and secured it against the like accident for the future by a stone roof. This prelate increased the number of prebends in his church, and augmented its revenues with several manors and estates. In imitation of the barons and some of the bishops, particularly his uncle the bishop of Salisbury, he built three castles; one at Banbury, another at Sleaford, and a third at Newark. He likewise founded two monasteries; one at Haverholm, for regular canons and nuns together; the other at Tame, for white friars. He went twice to Rome, in the years 1142 and 1144. The first time, he came back in quality of the pope's legate for calling a synod, in which he published several wholesome and necessary canons. In August 1147 he took a third journey to the pope, who was then in France, where he fell sick through the excessive heat of the weather, and returned with great difficulty to England, where he died, in the 24th year of his prelacy.

Alexander, *William*, earl of Stirling, an eminent Scotish statesman and poet in the reigns of James VI. and Charles I., who, after travelling with the duke of Argyll as his tutor or companion, wrote a poetical work, with the view of alleviating the sorrows of unsuccessful love, under the title of *Aurora*. He then removed to the court of James VI., where he applied to the more solid parts of poetry, forming himself upon the plan of the Greek and Roman tragedians. In 1607 he published some dramatic performances, entitled *Monarchic Tragedies*, dedicated to King James, who was so well pleased with them as to call him his philosophical poet. After this, he is said to have written *A Supplement* to complete the third part of Sir Philip Sidney's *Arcadia*. He also wrote a poetical piece, entitled *A Parænesis to the Prince*; and in 1614 he published his last poem, called *Doomsday, or the Great Day of Judgment*. His poetical works were published by himself, in a folio volume, under the title of *Recreations with the Muses*. He was made gentleman-usher to Prince Charles, and master of the requests; was knighted; and obtained a grant of Nova Scotia, where he projected the settlement of a colony, but afterwards sold it to the French. In 1626 he was made secretary of state for Scotland, was created first viscount and then earl of Stirling, and died in 1640.

Alexander I. *St*, whom St Irenæus reckons the fifth bishop of Rome, succeeded St Everistus in the year 109, and died in the year 119. There is no account of his life, and the epistles which are attributed to him are suppposititious.

Alexander II., king of Scotland, succeeded his father William in 1213, at 16 years of age. He made an expedition into England, to oppose the tyranny of King John, who returned the visit, and was offered battle by Alexander, but refused it. He took the city of Carlisle from Henry III., which was afterwards exchanged for Berwick. Alexander died in 1249, in the 51st year of his age and 35th of his reign, and left for his successor his son,

Alexander III., who was crowned king of Scotland in 1249. The Cummings, a powerful family, took arms against him, and, taking him prisoner, confined him at Stirling; but he was afterwards released by his subjects. He married the daughter of Henry III., king of England and was at length killed by a fall from his horse, on the 10th of April 1290, after having reigned 42, or, according to others, 37 years.

ALEXANDRETTA, by the Turks called *Scanderoon*, a town in Syria, at the extremity of the Mediterranean Sea. It is the port of Aleppo, from which it is distant 28 or 30 leagues. It is now, properly speaking, nothing but a village, without walls, in which the tombs are more numerous than the houses, and which entirely owes its existence to the road which it commands. This is the only road in all Syria where vessels anchor on a solid bottom, without their cables being liable to chafe; but in other respects it has many inconveniences. It is infested during winter by a peculiar wind, called by the French sailors *le Raguier*, which, rushing from the snowy summits of the mountains, frequently forces ships to drag their anchors several leagues; and when the snow begins to cover the mountains which surround the gulf, tempestuous winds arise, which prevent vessels from entering for three or four months together. The road also to Aleppo by the plain is infested by Curd robbers, who conceal themselves in the neighbouring rocks, and frequently attack and plunder the strongest caravans. But the worst circumstance is the extreme unwholesomeness of the air, occasioned here by stagnant waters and mephitic exhalations. It may be affirmed that this every year carries off one-third of the crews of the vessels which remain here during the summer; nay, ships frequently lose all their men in two months. The season for this epidemic disorder is principally from May to the end of September: it is an intermitting fever of the most malignant kind, and is accompanied with obstructions of the liver, which terminate in dropsy. To this baneful epidemic, Alexandretta, from

Fig. 1

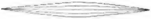


Fig. 2

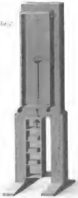
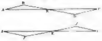


Fig. 11



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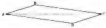

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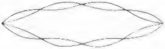

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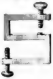
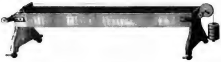


Fig. 3.



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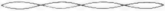


Fig. 4

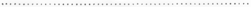
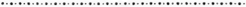


Fig. 5



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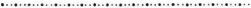

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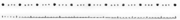

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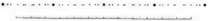

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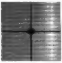

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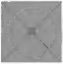

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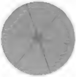

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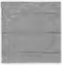

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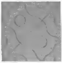

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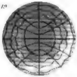
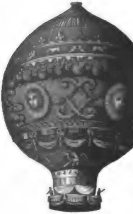
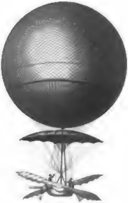


AEROSTATION.

MONTGOLFIER'S BALLOON



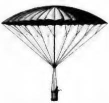
BLANCHARD'S BALLOON

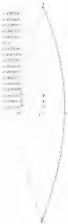


GARNERIN'S PARACHUTE

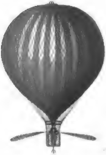
GARNERIN'S PARACHUTE

in descending

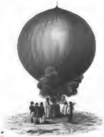


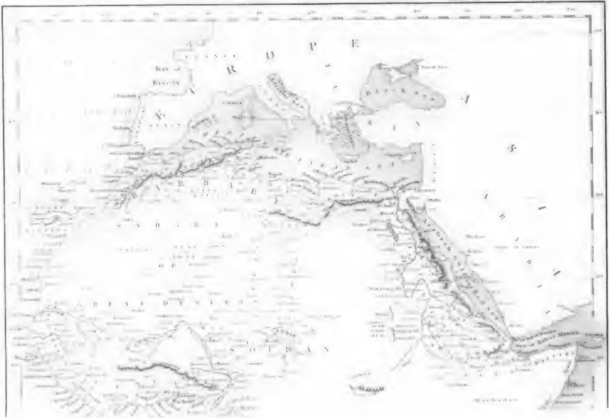


LUNARDI'S BALLOON



CHARLES' & ROBERTS' BALLOON




EUROPE
Bay of Biscay
SPAIN
Finisterre
Lisbon
Str. of Gibraltar
Balearic I.
Corsica
Sardinia
Adriatic Sea
Black Sea
ASIA
Candia
Cyprus
Alexandria
BARBARY
SAHARA
GREAT DESERT
SOUDAN
Arabian Gulf or Red Sea
ARABIA
Str. of Babel Mandeb
Sea of Babel Mandeb
Socotra
C. Guardafui
10
20
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40
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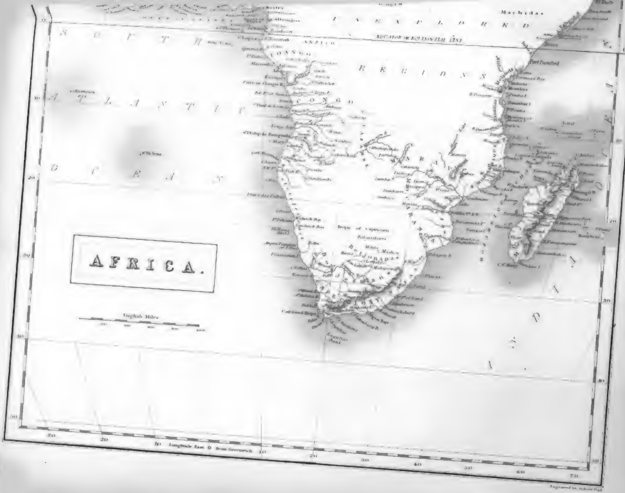
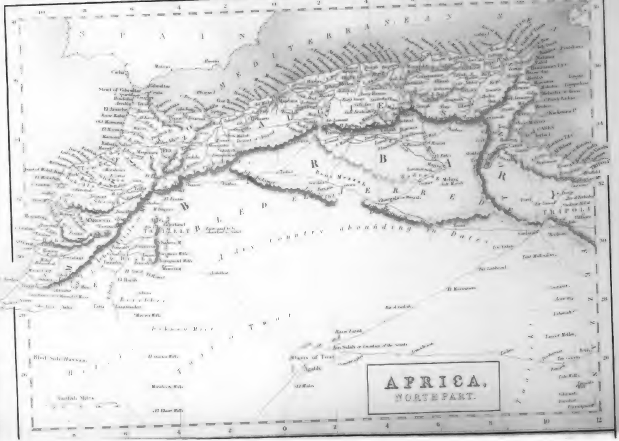
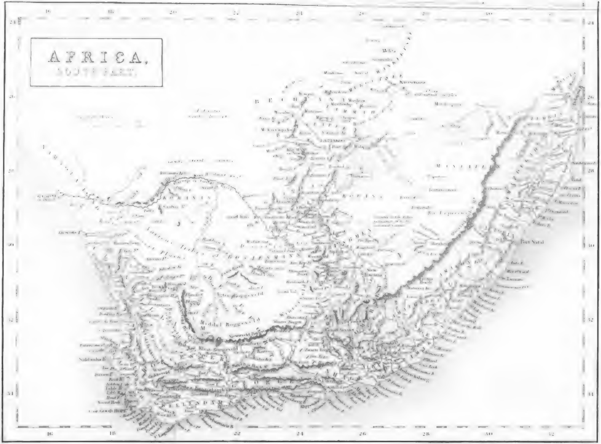
60
70


AFRICA.
SOUTH ATLANTIC OCEAN
UNEXPLORED REGIONS
EQUATOR OR EQUINOCTIAL LINE
Mashidas
LOANGO
ANZICO
CONGO
BENGUELA
CAFFRARIA
Desert of Ceperacam
St. Helena
Ascension
Cape of Good Hope
Natal
Port Durnford
Zanguebar
Mozambique
St. Mary
INDIAN OCEAN
English Miles
200
400
600
800
1000
Longitude East 0 from Greenwich
0
10
20
30
40
50
60
70
Engraved by Sidney Hall



AFRICA,
NORTH PART.



Engraved by S. Hall, Bury Str.t Bloomsb.y

FINLAYSON'S PATENT SELF-CLEANING PLOUGH

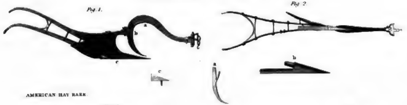


Fig. 1. Fig. 2.

AMERICAN HAY RAKE.

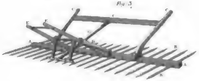


Fig. 3.

FINLAYSON'S PATENT SELF-CLEANING HARROW.

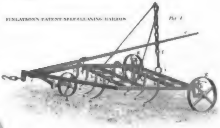


Fig. 4.

MORTON'S REVOLVING HARROW.

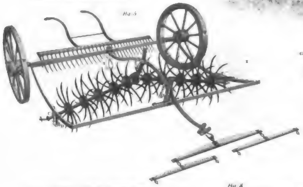


Fig. 5.

HAINAULT SCYTHE.

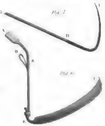


Fig. 7. Fig. 6.

CLOSE CART WITH CORN AND HAY FRAME.

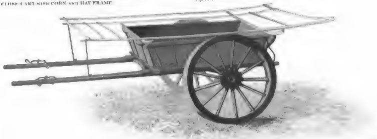
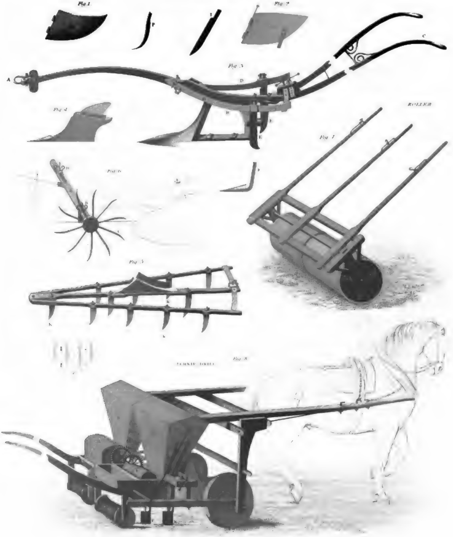


Fig. 8.

Mr MORTON'S UNIVERSAL DRILL, PLOUGH and HARROW



VIII.

[illegible]

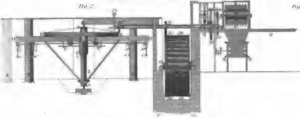
[illegible]

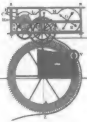
AGRICULTURE

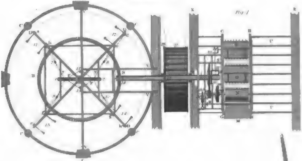
AGRICULTURE. PLATE IX.

THRASHING MILLS.

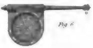
HORSE OR WATER POWER



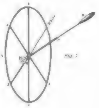




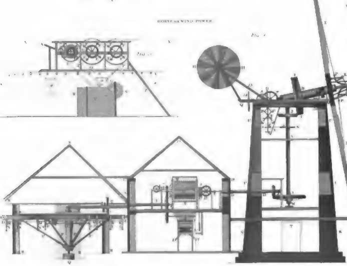
WAY-WISER



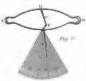
ODOMETER



HORSE OR WIND POWER



DYNAMOMETER

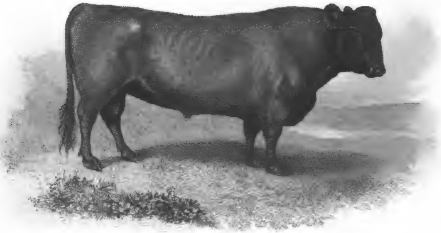


XI.

AGRICULTURE.

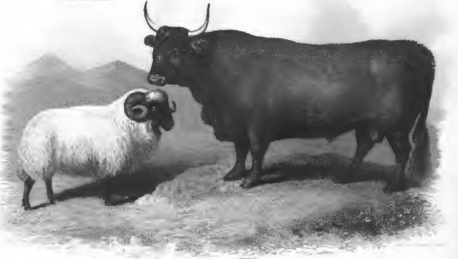
PLATE XV.

Galloway Bull



Argyleshire Bull

Black faced Ram.



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